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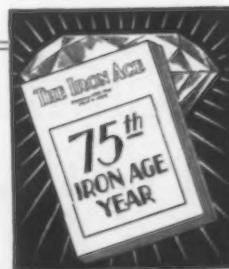
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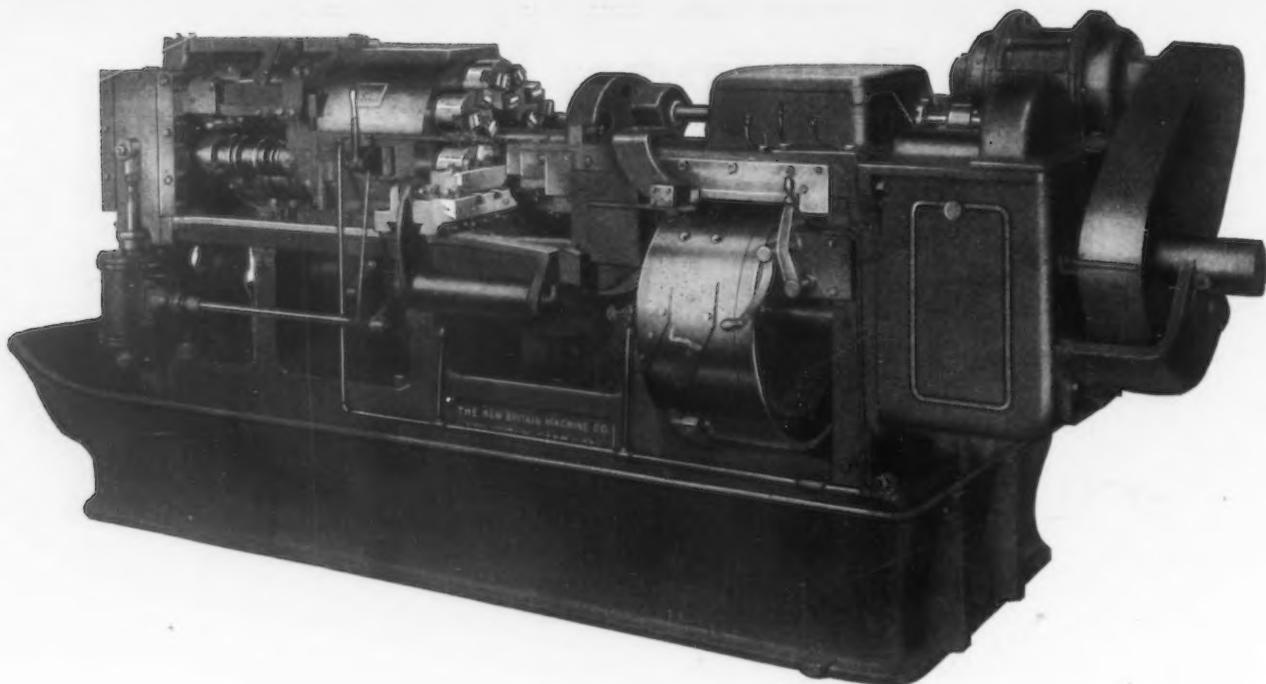
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THE IRON AGE

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Foreman Must Know His Men

By HERBERT M. RAMP



IF a foreman complains of his superiors or condemns their orders, he is sowing the seeds for the same kind of crop in the minds of his men.

Work must be planned so that it will not cause delay. Nothing so upsets production as having one department behind.

System is the boiled down essence of past experience. It is indispensable, but must be supplemented by the foreman's initiative.

THE foreman's first and most difficult duty is to obey orders. He must learn to take the instructions given him and carry them out efficiently. Obedience marks him as a man who may go higher.

A foreman's experience and opinions may run counter to his orders. He may even know that his own ideas are better than those of the management. In such cases it is his duty to report to his superior his knowledge or opinion and to support his conviction with every argument at his command. But after he has been ruled against he must carry out his instructions, not automatically, not sullenly, not with a resentful feeling and with a hope that they will not work well, but with a genuine desire for their success. That is the measure of a successful foreman, for if he learns that degree of self-control it is difficult to see how he can be a failure in other things.

A certain foreman was very energetic in pressing his own views as to the conduct of his job, and often caustically criticized the management because it would not always let him do as he wished. But later he became president of a company himself, and then he learned there were larger considerations than the conduct of any one department, that the good of the whole organization must be considered, before that of any branch. He learned to respect the foremen who obeyed orders and to pray for those who did not.

A foreman will always have certain latitude in his work, no matter what it may be. He will always have

an opportunity to develop his ingenuity and resourcefulness. He can show his caliber even in the manner in which he carries out his instructions.

The men under a foreman's supervision are influenced by the way he carries out his orders. If he is lax, they will be lax. If he is indifferent, so will they be. If he is loyal and obedient, those who work for him will be more conscientious in carrying out his instructions. If the foreman complains of his superiors, condemns orders issued to him, or shows a spirit of resentment against proper authority, he is sowing seeds for the same kind of a crop in the minds of his men.

Foreman Must Avoid Delays

ANOTHER essential in a foreman is that he plan his work so it will be on time, so it will not cause delay. Nothing upsets the production of a factory like having one department or one man behind.

The failure of one man's work can delay or lose the sale of thousands of dollars of the product. It disappoints the sales force and the customer, it impairs the profits of the concern. A delay may not always be disastrous, but there is always the risk that it may entail serious loss. The foreman may have ample excuse for delays. Machine broken down, men off sick or quit, orders wrong, material late! But real leadership and planning will take care of such con-

tingencies. It would be easy to run a department where there were no unforeseen difficulties.

Foreman Must Plan Work Ahead

The foreman must plan ahead. He must learn the capacity of his department, of his machines, of his men. He must set up a reserve for machine failures, for absentees, for spoiled work. He must do these things at the start. If he waits until trouble comes, he is like the locomotive engineer who lets his steam run down when his train is late.

Every company gives its foremen some kind of a schedule to run on. It may be called system, planning, or any other name. It is the boiled down essence of what has been learned from the success and failures of thousands of operations. It prevents repetition of errors and experiments. It points the shortest and safest route between two points. A plant without a system would be like a railroad without a timetable. It is an absolute necessity in any manufacturing plant, and yet no matter how detailed, elaborate or perfect it is, it can never take the foreman's place, or release him from his responsibilities or his duties.

System Futile Without Foreman's Initiative

System is inert, lifeless. It has no initiative. It is built upon the well trodden road of successful achievement. It does not invent. It does not stimulate ingenuity, because it does not reach after the untried. It is not resourceful or progressive. System is like street signs and house numbers. It gives you your bearings, tells you how to reach a known objective. But it doesn't guide you into uncharted territory.

The foreman must have the brains, the flexibility, the adaptability to supplement the system. Systems may give him a 10-hr. day with 60 min. to the hour, but he may have to stretch the hours so that he gets 70 min. work from each in order to fill his contract. That is his job.

The development and progress of any business forces changes in systems. Finding a new tool or new device, or a different method of doing things means laying out and paving new streets for system to name and record.

Foreman Must Study His Men

THE foreman must know his men. He must learn their strong points and their weak points. They are his tools, and his most important ones, and they

require particular attention because they do not run true to any formula. They are influenced by various conditions—by the state of their health, by their surroundings, companions, habits, home life and many other things. They may represent all grades of mentality and character. One may require the harshness of the rasp to clear his vision so that he can see his work as he should. Another may require patience:

he may be slow to grasp what is expected of him. A third may only stand the velvet touch of correction; he may be nervous and high strung—he means to do right but is mistaken, or does not know how.

There is little advantage in dismissing a man unless his case is hopeless. One does not cast aside a tool because it does not fit, or the temper is wrong. Men are like tools; they need to be reground and retempered, not cast into the scrap heap.

A foreman knows the failings and capacities of the men he has. He knows their good and bad points. New employees are unknown quantities, and a change in one's force is likely to be for the worse.

Workmen Need Help

A foreman who cannot get along with his men, with reasonable exceptions, cannot get along with his work. We have all seen foremen who felt their duty was simply to walk up and down the gangway, issue orders

and look wise. That is the smallest part of a foreman's job. His greatest work is to serve and help those who are responsible to him.

The average man does not make mistakes on purpose. He tries to do his work well (even though he does not do all he can). He realizes that to hold his job he must give service. He may have faults and shortcomings, but nine times out of ten he needs help and not reprimands. A foreman may quarrel with his superior or be abusive to his equals, but he should always be courteous to his men. When he is not, he is losing money for his company.

He must maintain the morale of his department. His influence should be such as to make every man take an interest in his work. He should make them feel that their work is important to the company, that they are an essential part of the organization the same as he is.

He must not expect more enthusiasm from them than he possesses himself, and he must not be disappointed because some are sullen and stupid and indifferent, if he himself is lacking in spirit.

The foreman should not measure the poor man by the good man, but rather by what he did do and what he does now. A foreman devotes much time and thought to inanimate things, like tools, machines and jigs, to

(Concluded on page 204)

Screw-Driver Handles Made With Electric Steam

THE Vlchek Tool Co. of Cleveland is one of the largest manufacturers of mechanics' hand tools in the country making a wide variety of wrenches, hammers, pliers, screw-drivers, and the like. Three years ago the management came to the conclusion that there was need for a high-grade screw-driver which could be sold for a reasonable price, and gave the problem to the research department, which experimented continually with many different types of compositions for screw-driver handles.

Recently a compound was perfected that met exacting demands. This compound, when applied to a steel blade to make a complete screw-driver, has high dielectric strength, is tough, strong, durable, and remains slightly "tacky" even in continued use, so that the handle has no tendency to slip in the hands. The compound, which has proved so satisfactory, is very ingenious and requires careful handling in order to produce the desired results.

Raw material for the compound is placed in batch mixers equipped with high-pressure steam jackets, and is thoroughly mixed and kneaded for about three hours under the action of heat. Since the material is sensitive to heat changes, the temperature must be held within close limits.

After mixing, a batch of the material is carried to an adjacent

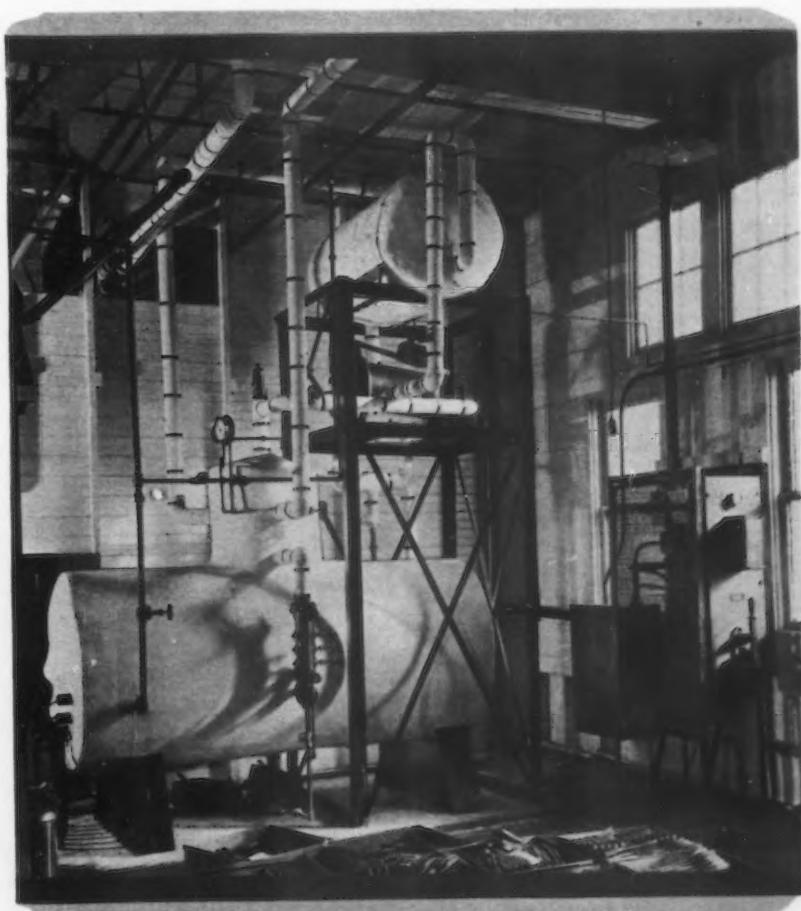
By W. E. BENNINGHOFF
Industrial heat engineer, Cleveland Electric Illuminating Co., Cleveland.

press, where it is squeezed into a slab approximately 24 in. square and about $\frac{3}{4}$ in. thick, indented to divide it into small briquets approximately 3 by 6

in. These slabs are then allowed to season a certain length of time.

After this curing process the briquets are broken off and placed in a steam-heated platen oven in order to bring them to a temperature at which the material becomes plastic. This temperature must also be closely controlled, because too low a temperature will not permit the material to flow properly in the next operation and too high a temperature causes an effect similar to burning. This platen oven was designed by the Vlchek Tool Co. to meet exacting conditions.

The oven, as illustrated consists of seven platens, which are each a block of steel 24 in. square by $1\frac{1}{2}$ in. thick. In this block are drilled $\frac{3}{4}$ -in. holes every 2 in. along one dimension, and at each end is drilled a similar hole connecting the many holes drilled at right angles. All openings but two are then plugged with screw plugs, and to these open holes steam lines are connected, so the result is a gridiron of steam heat with no live steam coming in contact with the material to be heated. The platens are placed one above the other about $1\frac{1}{2}$ in. apart in a thoroughly insulated sheet-iron case.



ELECTRIC Steam Generator, Entirely Automatic, Installed in One Corner of Screw-Driver Department. Temperature is closely controlled at source. If one operation requires a lower temperature than neighboring equipment, it is fed with steam through a pressure reducer.



FLAT Briquets of Organic Compound Are Heated to Plastic Condition in Platen Oven. Each tray is a steel slab, through which holes are drilled to form a gridiron of steam passages.

Briquets, after being heated in the previously described platen oven for a certain length of time, are then put into a hydraulic press, where the compound is pressed around the screw-driver blades under 50-ton pressure to make complete screw-drivers. The press is equipped with four hollow dies, through the bottom of which are thrust four to six screw-driver blades, depending upon the size, held in a jig. The dies used are of high-strength special alloy steel and are chrome-plated to insure long life. A briquet of the compound is placed in the hollow die and a plunger die is lowered, forming the handles.

Presses Have Unusual Automatic Control

The presses have an unusual automatic control to insure absolute uniformity and finish of the screw-drivers. After the bare blades are jiggled into the hollow die and clamped, a green light at the top of the machine indicates if they are spaced and clamped properly. Improper clamping is apt to break the expensive dies. If the green light does not light, steps are taken immediately to remove the cause of improper clamping. After the green light shows, pressure is applied and the plunger descends into position. If the proper pressure is applied a white light flashes and, if not, steps are taken to remove the cause of improper pressure. If the green light and white light both show, then a time clock is started which runs for a prescribed length of time and then flashes a red light. Complete screw-drivers are then removed and the process repeated. Each cycle repre-

sents a production of 16 to 24 complete screw-drivers. In addition to the light control, a separate electrical system actuates a 10-point recorder, each press controlling one point, giving a graphic record of the length of time each batch of screw-drivers has been held under pressure.

On a platform above the presses is placed the operating mechanism, consisting of a motor-driven oil pump for each press, an air compressor for supplying air to clean the dies, and a water pump furnishing a flow of hot water through the dies in order to keep them operating at the proper temperature.

Accurate control of the temperature in the mixers and ovens introduced a problem in planning the layout. The existing boiler plant was too far away and did not have sufficient capacity or pressure. Circulating hot oil was considered for a heating medium, but since the temperature of these operations might be changed as possible improvements are made in the compound, this method was discarded since two different temperatures could not be obtained from the same source. It was then decided to use an electric steam generator for these heating processes, since the temperature of the superheated steam could be controlled very closely, and

by means of reducers different temperatures could easily be obtained in different parts of the system.

The steam generator installed has a connected load of 90 kw., 440 volts, 3 phase, but was built to take 240 kw. to care for future expansion. (In order to increase the capacity it will be necessary only to insert more immersion units.) The generator is 7 ft. 4 in. long between heads and 36 in. diameter, with a central steam dome having two 1½-in. steam outlets. In each 7/8-in. end plate are twelve 2-in. tapped holes for the electric immersion heating units; for the present operation nine openings have been fitted with General Electric standard 10-kw. immersion heating elements.

The electric steam generator was designed and built by the General Electric Service Shop in Cleveland. The generator shell was built for 200-lb. pressure in accordance with the American Society of Mechanical Engineers' code. After the generator was installed it was run for about ten days without any insulation, in order to observe any possible defects that might have been overlooked in the inspection. After this ten-day test proved that the electric steam generator met all specifications and inspections, it was insulated with 3-in. magnesia asbestos.

The electric steam generator is equipped with various standard safety devices and indicators. Close regulation of steam temperature and pressure is had by pressure regulator with steam gage, control switch and contactor panel.

One of the features of the operation of this electric steam generator is the unusual close control of temperature. In mixing the compound the steam pressure is held between 115 and 120 lb., which is equivalent to 347.2 to 350.1 deg. Fahr., or a differential of plus or minus 1.45 deg. Fahr. In the platen oven a pressure reducer is used and here the temperature is held between 335.2 and 337.9 deg. Fahr., or a differential of plus or minus 1.35 deg. With the above described apparatus 15,000 completed screw-drivers are made in 24 hr., operating only six presses days and three presses nights. With this production only 530 kwhr. were used in the electric steam generator.

This unique steam generator is installed adjacent to the operations where steam is needed, in a corner of the frame building housing the screw-driver department. No stack, boiler settings or fireproof building is needed, thus keeping the installation cost at a minimum. The first cost of the equipment is also low and the maintenance negligible. Furthermore, there is no labor needed, since the equipment is entirely automatic in operation.

The accuracy of control, flexibility, economy of operation and installation of the electric steam generator at the

Vlchek Tool Co. have made possible the mass production of a new type high-grade screw-driver at a low price, which would not be practical with any other type of equipment.

Heavy Hollow Rolled Drums

A DENSITY tunnel for aircraft investigations was recently made at the Atlas Works of John Brown & Co., Ltd., Sheffield. It consists of a cylindrical chamber with hemispherical ends. The cylinder is made of four hollow rolled rings and the ends, of steel castings.

Each ring, measuring 17½ ft. inside diameter and 8¼ ft. long, was rolled hollow and seamless from a steel ingot weighing 90 tons. Machining, internally and externally, reduced this weight to 50 tons. The wall thickness is 5⅛ in. The four rings combined with the end castings make a structure of about 250 tons weight and 50 ft. long.

Assembled as a unit, the rings are held together and to the end castings by forged steel clamps, set up tightly with a large number of heavy bolts. The joints are packed with leather and with metal, and the internal pressure to be withstood is about 350 lb. to the square inch.

HYDRAULIC Presses for Making Composition Handles. Four water-heated dies are mounted on each bed plate, and into the base of each die five steel screw-driver shanks are thrust, through tightly fitting holes. A briquet of plastic compound, dropped into the recess in the die, is then squeezed into proper shape to form five handles simultaneously.





Airplane with Packard Diesel Power Plant. The late Capt. L. M. Woolson, designer of the engine, is at the left, and Walter Lees, pilot, is at the right.

The New Diesel Aircraft Engine

By FAY LEONE FAUROTE

ON May 14, 1929, the following telegram was received by the Packard Motor Car Co., Detroit. It was signed by Capt. L. M. Woolson, and came from Old Point Comfort, Va. (Langley Field):

"Arrived O. K. after 6 hours and 15 minutes uneventful flight, consuming \$4.68 worth of furnace oil."

Thus was the world's first long distance flight of a Diesel-powered airplane announced. Since that time numerous tests both in the laboratory and in the air have verified other predicted results. The Diesel aircraft engine is beginning to be regarded with favor by automotive engineers everywhere, especially for use where a continuous full-load operation is demanded. Motor coach and truck owners say that the Diesel offers great possibilities. Because it is able to burn as its fuel ordinary furnace oil instead of gasoline, and because such oil costs less and is not so inflammable, airplane operators are watching Diesel developments closely.

Weight Brought Down to 2.26 Lb. per Hp.

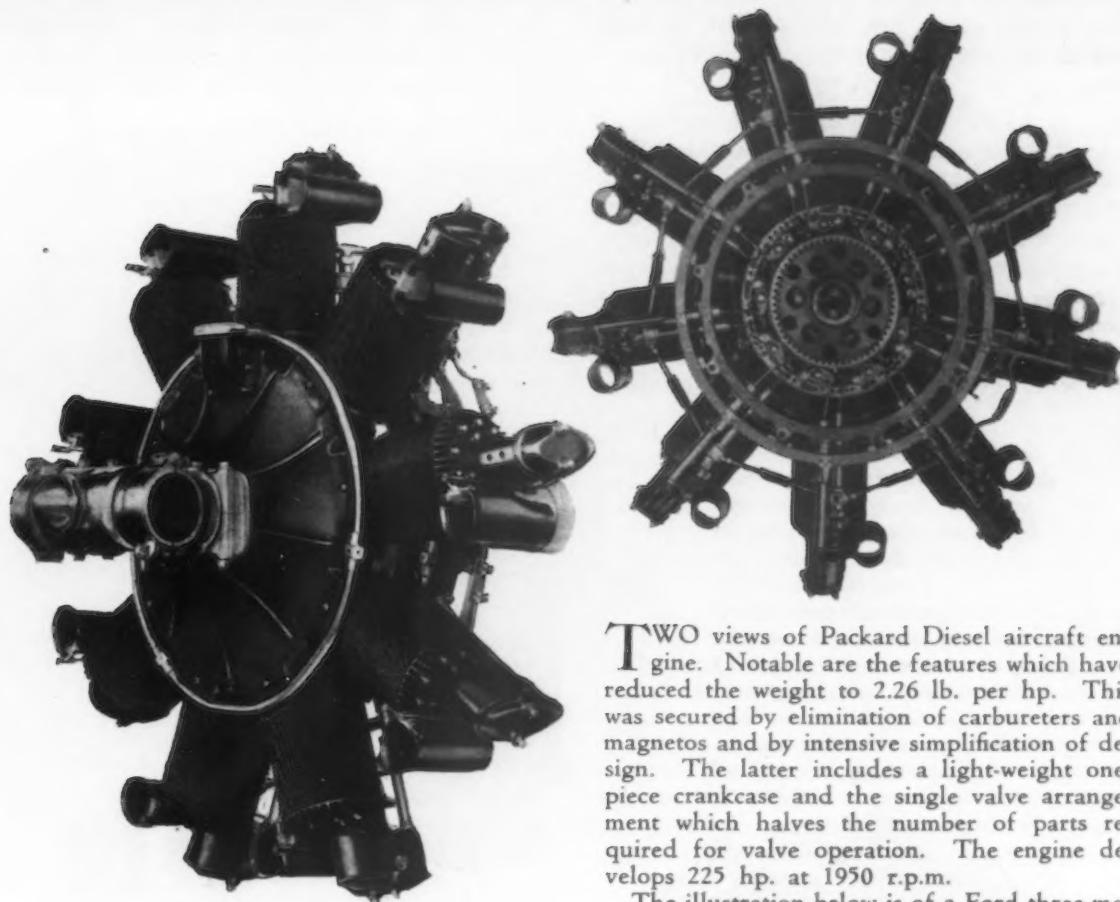
Another interesting characteristic of the design developed for aircraft is the manner in which the weight has been brought down to about one-tenth of that formerly thought possible. Diesel engines formerly weighed about 25 lb. per hp. but this new Packard weighs but 2.26 lb. per hp. Furthermore, while stationary Diesel engines used in marine service run from 100 to 300 r.p.m. and the so-called high-speed

Diesels have a maximum speed of 1200 r.p.m., this new aeronautical power plant has been speeded up to 2000 r.p.m. It has a compression ratio of 16:1, an air compression of 500 lb. per sq. in., a compression temperature of 1000 deg. Fahr., and a fuel pressure of 6000 lb. per sq. in. It develops 225 hp. at 1950 r.p.m. and it weighs 510 lb. Airplanes equipped with this engine have climbed to an altitude of over 18,000 ft. without any special equipment.

The engine has nine cylinders with a bore of 4 13/16 in. and a stroke of 6 in., producing a displacement of approximately 980 cu. in. A radial air-cooled type, the outside diameter is roughly 45 in. Superficially it looks like many other radial air-cooled aircraft engines. Upon close examination, however, it will be seen that it is much simpler. There is no ignition system. Neither is there a carburetor. Each cylinder has only one valve, which although operated by push rods in the usual manner, serves in the Diesel for both inlet and exhaust.

Operation of Diesel Engine

Intrinsically, the real difference between the operation of the Diesel engine and the conventional gasoline type, lies in the introduction of and the burning of the fuel. In the ordinary type of four-stroke cycle engines, a combustible mixture of gasoline vapor and air is drawn into the cylinder by the suction stroke. This is then compressed. When near the end of this operation, it is fired by an electric spark. Then the piston moves forward delivering power to the crank-shaft, and ultimately returning, scavenges the cylinder.



TWO views of Packard Diesel aircraft engine. Notable are the features which have reduced the weight to 2.26 lb. per hp. This was secured by elimination of carburetors and magnetos and by intensive simplification of design. The latter includes a light-weight one-piece crankcase and the single valve arrangement which halves the number of parts required for valve operation. The engine develops 225 hp. at 1950 r.p.m.

The illustration below is of a Ford three-motor airplane equipped with Packard Diesels.

In this type of engine, a considerable amount of wastage may prevail. Mixtures run from 10:1 to 20:1 or wider variations are not uncommon. Dirty spark plugs and such inefficient mixtures may reduce the effective power strokes quite appreciably, especially in cold weather.

In the Diesel cycle, however, instead of making use of such unreliable mixtures of air and fuel, as in the gasoline engine, air alone is introduced into the combustion chamber. This air is compressed in a ratio of approximately 16:1 and reaches a temperature of 1000 deg. Fahr. This is far above the spontaneous ignition temperature of the fuel oil used. The fuel is then injected in a highly atomized condition just before the piston reaches the outer end of the stroke. Coming in contact with this highly compressed and heated air, the atomized fuel burns instantly. Thus it will be seen that the Diesel engine generates its own heat and starts combustion by means of this highly

compressed air. No outside electrical ignition system is needed. Of course the fuel must be in a well-atomized condition, and its quantity and time of injection carefully measured. The Diesel engine has another advantage over the conventional type in that a small quantity of fuel is burned just as efficiently as a full charge.

Because the air used in Diesels is compressed to such a high temperature, liquid fuels with a very high ignition temperature may be employed. Such oils correspond more nearly to the crude, and cost much less than gasoline. Fuel oil ignites at only relatively high temperatures. The fire hazard which is really very grave in the case of gasoline-operated airships is thus very materially reduced. In fact, if the Diesel offered no more advantages than those arising from this reduced fire hazard, its development would be well worth while.

It was the good fortune of the writer to have



Captain Woolson, the designer of this power plant, in a conversation held only a few weeks before his fatal flight, outlined for him the three basic principles of this design.

"First," said he, "the engine must be strong enough to withstand maximum cylinder pressures, two or three times as great as those obtained ordinarily in a gasoline aircraft engine; secondly, a high degree of turbulence must be maintained in the cylinder to permit all the fuel combining with all the oxygen present in the cylinder during the extremely short time allotted for combustion at high engine speeds; and thirdly, the fuel pumps and nozzles must be designed to operate over a much wider range of speed

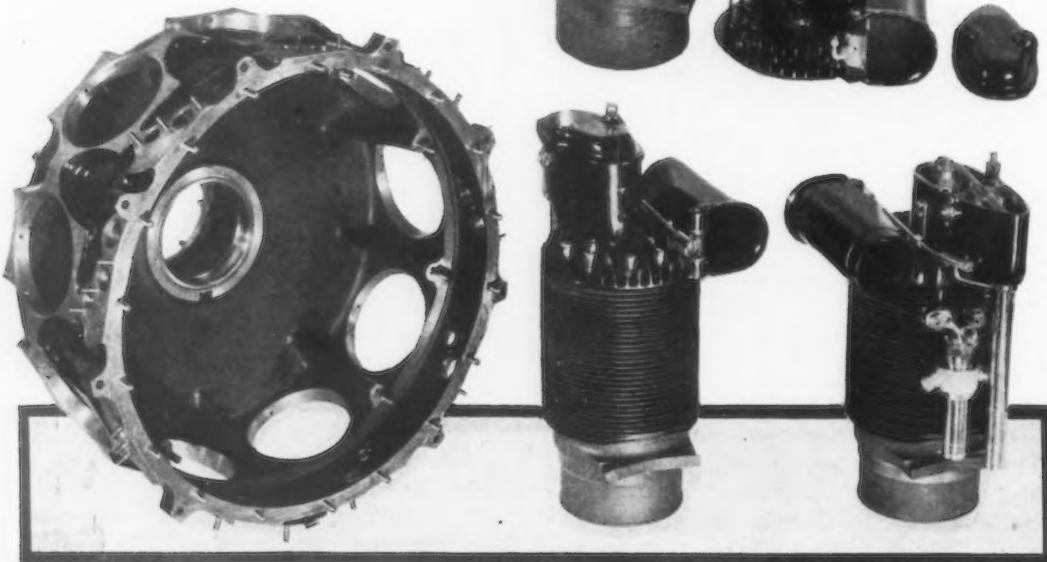
crankcase construction of extremely light weight and the single-valve arrangement which automatically halves the number of parts required for valve operation as found in conventional gasoline engines.

Crankcase Weighs Only 34 Lb.

"The crankcase, which weighs only 34 lb., is unique, not only because it is of one piece, thus dispensing with heavy flanges and bolts, but also in respect to the novel way in which the cylinders are fastened to it.

"Ordinarily, in a radial air-cooled aircraft engine, each cylinder is held to the crankcase by a number of studs screwed into the crankcase flange and projecting through the cylinder flange against which the

THE one-piece crankcase construction eliminates heavy flanges and bolts and is unique also in respect to the manner in which the cylinders are fastened to it. The Packard Diesel cylinder, cylinder head and valve-operating mechanism housing are shown at the right. Below these are front and rear views of the cylinders, showing fuel pump and nozzle unit, air shutter operating mechanism and rocker arm.



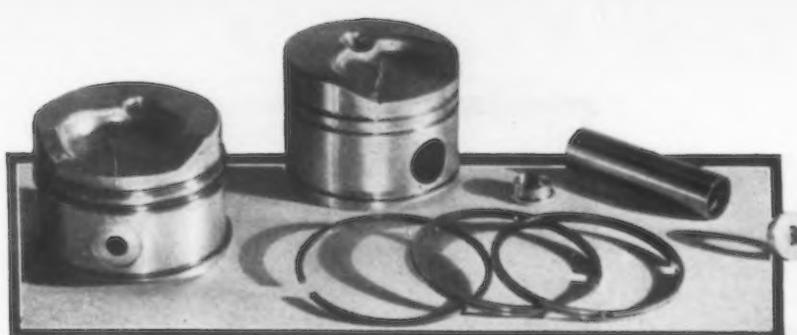
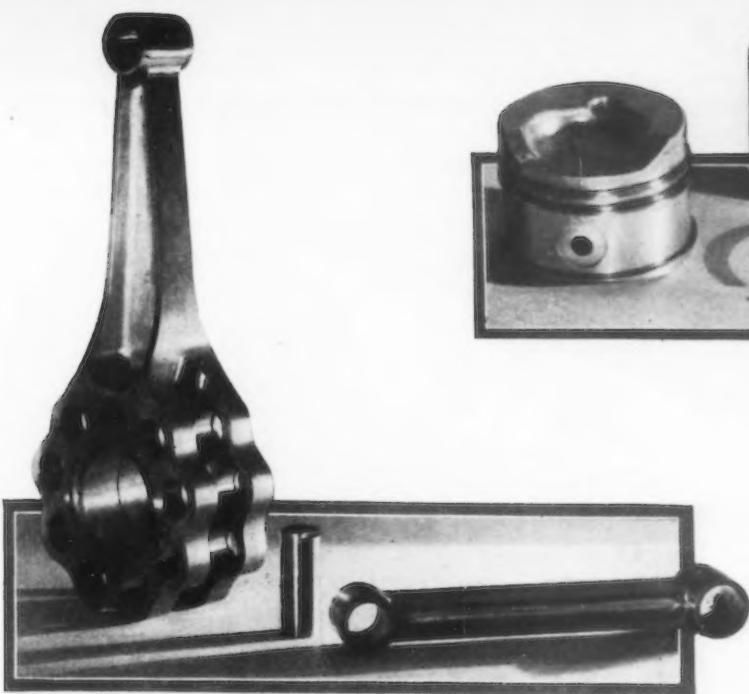
than has been found practicable heretofore in Diesel engines.

"The most interesting aspect undoubtedly is a consideration of the features that have brought the weight of the engine down to practically the same level as that of gasoline aircraft engines of equivalent power. Heretofore, even Diesel engines of the so-called lightweight modern type, have weighed around 25 lb. per hp., whereas this engine weighs but one-tenth as much. This great reduction in weight is essential, and it is not surprising that radically new methods of construction had to be employed to reach the desired objectives.

"Important weight economies have been secured, first, by the elimination of carburetors and magneto and, secondly, by an intensive simplification of design. Evidences of the latter are found in the one-piece

retaining nuts seat. With this arrangement the tension stresses resulting from the explosion loads in the cylinders are carried through the crankcase walls to the crankshaft main-bearing anchorage. This involves fairly heavy crankcase construction even with a gasoline engine, but such structure applied to the Diesel principle would require the use of very thick sections, since the light alloys used in crankcase construction have poor resistance properties for this type of shock loading.

"In the Packard engine, two circular hoops of alloy steel encircle the cylinder flanges in contact with the crankcase at the front and rear of the engine, and these hoops are contracted by means of sturdy turnbuckles so that an initial stress is set up in these hoops which exceeds by a wide margin the operating stress resulting from the cylinder explosions. Under this



system the crankcase is subjected to an initial compression which it is well adapted to resist. When the engine is running, however, these stresses are substantially reduced and at no time is it possible to transfer any tension loads from the cylinders to the crankcase.

"Although the analogy is not strictly correct, a comparison may be made with an automobile wood wheel, representing conventional aircraft-engine crankcase construction on the one hand, and a wire wheel, representing the new Packard crankcase arrangement on the other hand. The latter construction has proved considerably lighter because the load is not transferred from the ground to the hub directly through the lower spokes, as is the case with the wood wheel, but is spread over a great many more spokes arranged in the upper quadrant of the wheel. Those spokes in a wire wheel which are directly above the ground receive no load at all but rather have their initial tension reduced, just as in the new Diesel engine that section of the crankcase immediately below the working cylinder has its loads reduced rather than increased at time of explosion.

THE combination of fuel pump and nozzle unit contributes a great deal to successful operation of the engine. Five of the oil fuel pumps are shown at the right in the group below. At the left is shown one of the multiple spring valves of the Packard Diesel engine

FOR efficient operation, a high degree of turbulence must be maintained in the cylinder. In addition to shaping the inlet port to give incoming air a high-velocity spiral motion, the aluminum alloy pistons are made with a special shaped head having an eccentrically located pocket to assist in this.

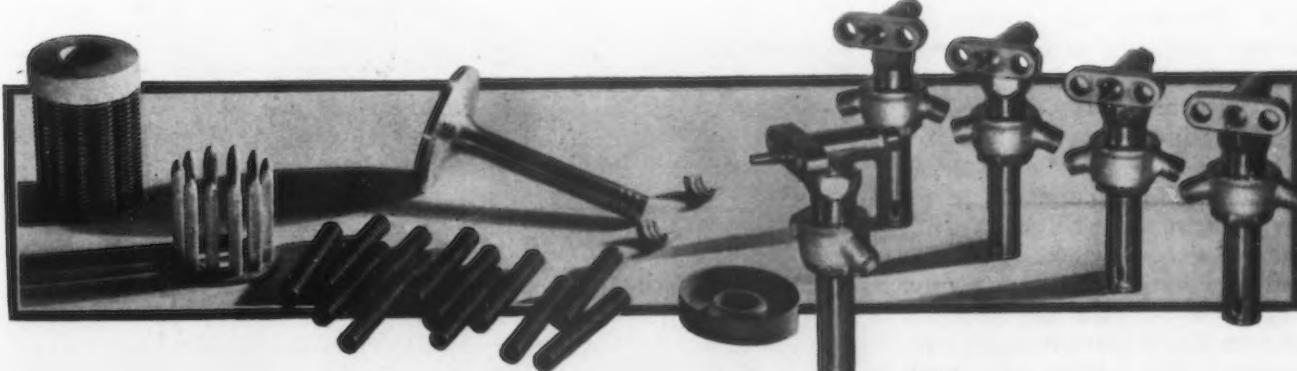
The master connecting rod (shown at left) with its eight links, follows current practice.

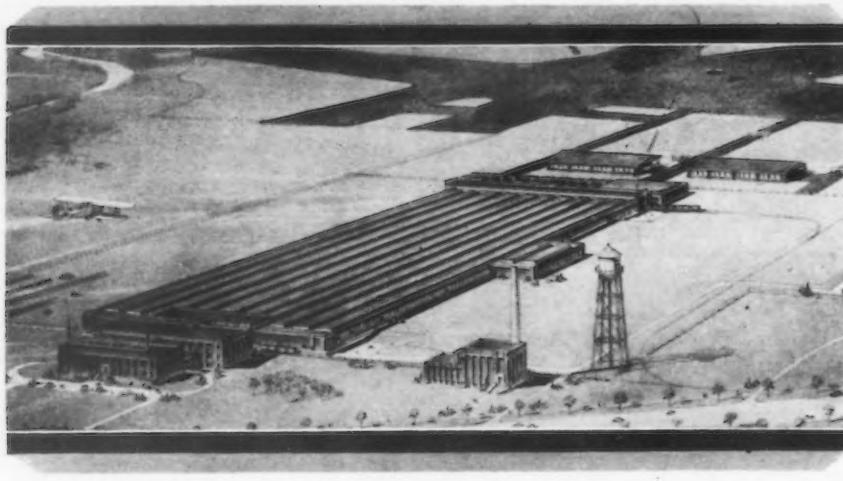
"Equal in importance to the crankcase construction that enables a light structure to withstand extremely heavy loads are the arrangements whereby the crankshaft and propeller are protected from excessively high stresses.

"The maximum cylinder-pressure are more than ten times as great as the average cylinder pressures during the working stroke. This would necessitate the pistons, connecting-rods, crankshaft and propeller being approximately ten times as strong as they would have to be to resist the average pressure were it not for the fact that effective measures have been taken to cushion these major parts of the engine from the shock-loading resulting from the high explosion-pressure. Advantage is taken of the fact that these peak explosion-pressure exist for a very short time in each

cycle. The crankshaft counterweights and the propeller are both flexibly mounted on the crankshaft so that, when the peak pressures occur, a cushion is interposed between the crankshaft and those parts which have the maximum inertial or flywheel

(Continued on page 201)





Line Production the Keynote of New Pratt & Whitney Aircraft Plant

By J. W. MARSHALL

WITH the slogan "there is no substitute for quality," and every man working on a straight day-work basis, quality of workmanship may be said to rank ahead of speed at the plant of the Pratt & Whitney Aircraft Co.

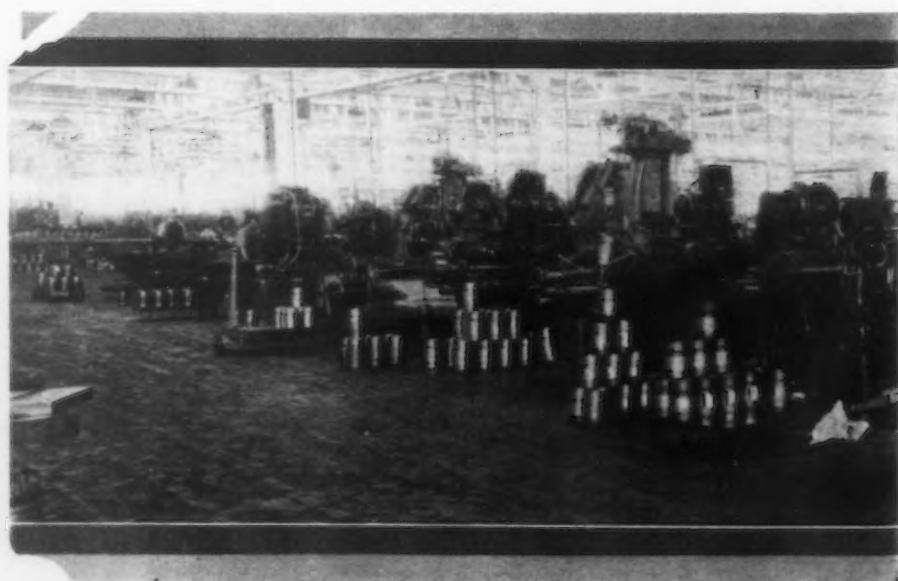
Opportunities for economical manufacture have not been overlooked, however, an example being the layout of the new \$2,000,000 plant at East Hartford, Conn., where Wasp and Hornet motors for the United Aircraft & Transport Corporation are built. In this shop the departments are arranged to assure continuous flow of material and parts toward assembly, testing and shipment with a minimum amount of traveling and handling.

The old plant of the company was a four-story building, and while it was found that the arrangement of the machines in it did have certain advantages, the feeling developed that these advantages were outweighed by an arrangement that would definitely reduce handling and trucking operations. Accordingly, to a degree, the old order was discarded, experiments in rearranging were tried, and the results attained proved to be all that had been hoped for. Consequently, as the company grew and the necessity for larger quarters became apparent, it was determined to solve

the problem of "getting the thing done" by building the new plant primarily to meet the needs of straight-line production. Because this new plant is an outstanding example of the complete elimination of lost motion and also because it is so designed that expansion can take place without any sacrifice of the no-lost-motion idea, it is of particular interest.

Main Factory Building 1000 Ft. Long

The group of buildings comprising the plant consists of a two-story administration building, a per-



sonnel building, an engineering building where experimental work is conducted, a power house, a garage, and the main manufacturing unit. The office building faces Main Street. Immediately back of it and connected by a bridge is the engineering building. Immediately back of the latter, being a continuation of it, is the main unit. The group occupies an area of 60 acres. The buildings are of steel, brick, and concrete.

The main factory unit is of one-story monitor construction with a floor area of 400,000 sq. ft., being 1000 ft. long and 400 ft. wide, with 40-ft. bays. Light is received through skylights, facing north and south, conceded the best for manufacturing, and the ventilation is secured by motor-operation of these skylights. Daylight is abundant in every part of the building.

The line of flow of material and work centers about a 15-ft. central trucking aisle running the entire length of the building and two narrower feeding aisles located on the sides and parallel to it. How the material enters the west end of the building and flows eastward as work in process to the opposite end with practically no lost motion will be explained in what follows.

Flow of Work Is From Sides to Central Aisle

All the aluminum parts are machined on the north side, all the steel parts on the south side of this central aisle. This arrangement facilitates the handling of the cutting oils, which are of different body grades for aluminum and steel, and also facilitates the handling and segregation of the drillings, turnings, and borings. All operations begin near the feeding aisles and work toward the central aisle.

Raw materials and finished purchased parts enter the receiving department by way of a siding at the

west end of the plant, the raw steel passing into the receiving department south of the central aisle, the aluminum parts into the receiving department north of this aisle. From the receiving department the materials, after being inspected, pass into the rough stores. The receiving, received-material-inspection, and rough-stock departments on each side of the central aisle are inclosed by fencing.

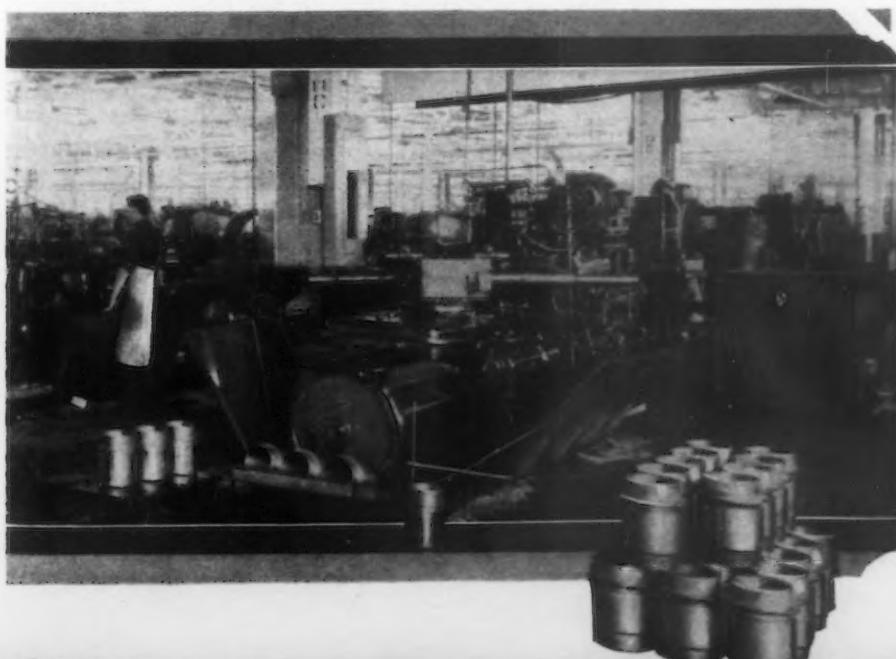
On the steel side, the cylinder-barrel department is located next to the rough-stock department. On the aluminum side, the cylinder-head department is next to the rough-stock department. Rough stock is fed into these departments through the feeding aisles.

This stock as it passes through the various machining operations works toward the central aisle along which it passes eastward to the cylinder-assembly department. After being assembled, these parts continue their journey eastward along the central aisle to the

finished-stock department to be used as needed.

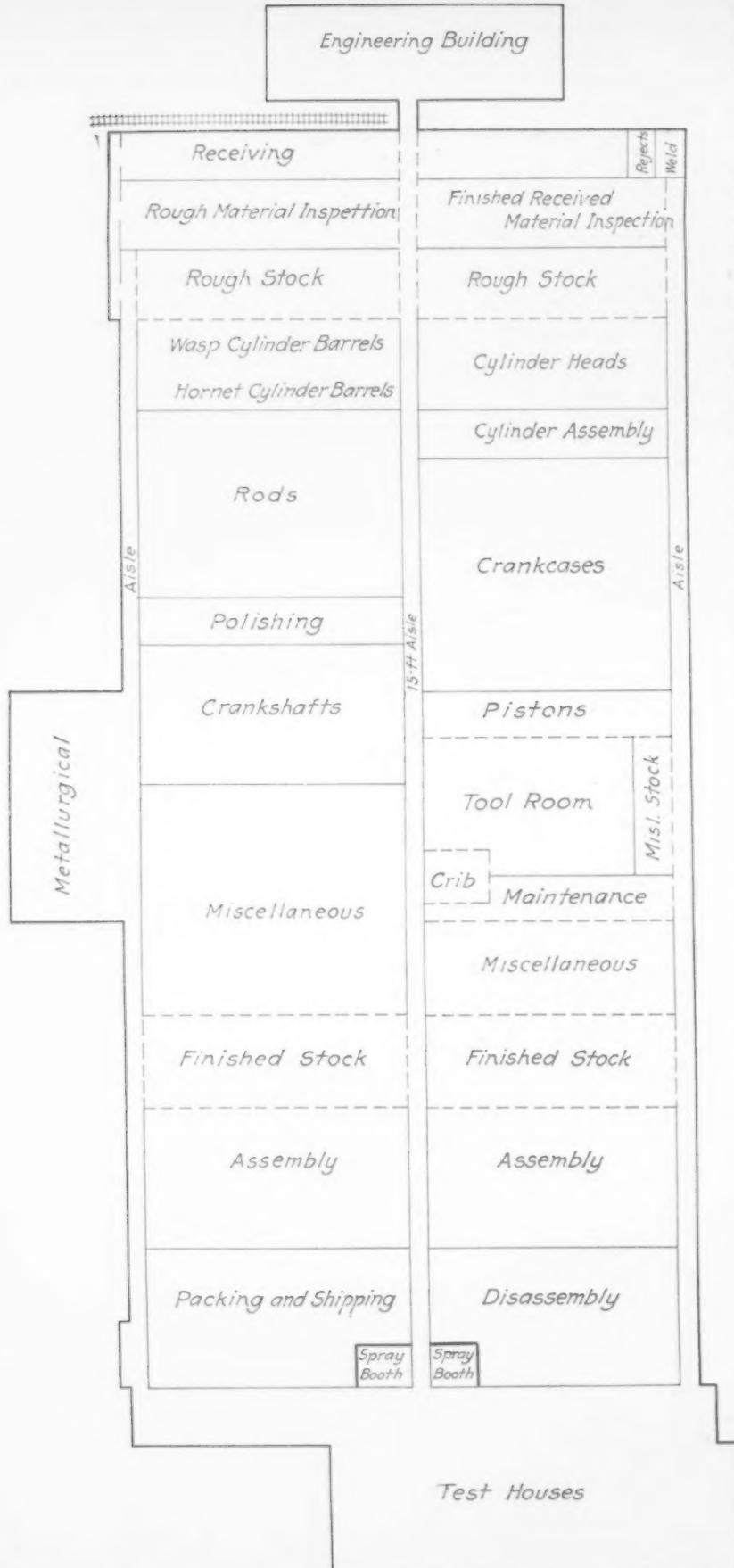
In a similar manner, the master connecting rods, linkrods, crankshafts, crankcases, pistons, and miscellaneous parts are fed to the outer sides of their respective departments along the feeding aisles from the rough-stock department, work toward the central aisle as machined, and pass eastward along this aisle to the finished-stock department.

A separate polishing department is maintained. It is located centrally between the rough-stock and finished-stock departments. Parts, such as connecting rods, to be polished are fed into this department through the feeding aisle as before; then work, as completed, toward the central aisle and travel eastward to the finished-stock department. The polishing depart-



THE Cylinder-Barrel Department Adjoins the Rough-Stock Department. Rough stock enters at side aisle, passes through machining operations and then goes eastward to cylinder-assembly department





THE Toolroom and Maintenance Stock Rooms Are Centrally Located, as Shown. Receiving, rough-stock, finished-stock departments are inclosed by fencing (shown by dotted lines)

ment is equipped with an efficient exhaust system to prevent dust getting into the atmosphere and hence to eliminate the possibility of dust getting into the motors during assembling.

Toolroom and Master Crib Centrally Located

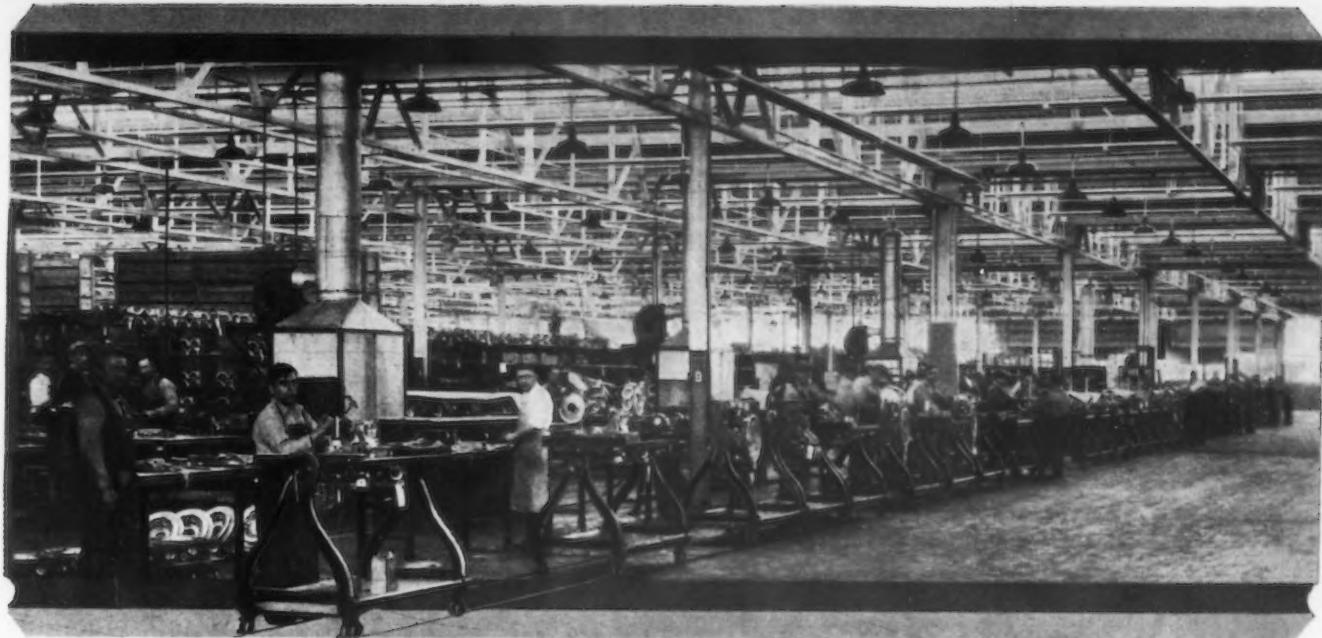
The toolroom, where jigs and fixtures and special tools are made, together with the master crib, where the tools are stored, and the maintenance and electrical stock rooms are located as a group on the aluminum side, just west of the finished-stock department. This location, in the central part of the plant, reduces to a minimum the distance to and from the various departments. Moreover, it should be noted that as the plant is enlarged, by the building of additional sections on the sides, these rooms will continue to be in the center of the plant. In addition to the master tool crib, sub-cribs are maintained in each department under the jurisdiction of the various foremen. Tools are supplied to the workmen by the checking system.

The metallurgical department consisting of a heat-treating division and of a chemical-and-physical-laboratory division is located centrally to the steel side. Since it is the steel parts that require heat treating, this department will still be centrally located when expansion takes effect. All materials are ordered to physical and chemical specification, and are tested in the laboratory division as to the engineering specifications.

The finished-stock departments on each side of the central aisle are inclosed by fences. Stock is stored in these departments in the order in which it will be used in the assembly departments, which are just east of them. Open racks, or shelves, however, take the place of the fence on the sides of the finished-stock departments adjoining the assembly departments. The stock is fed into tote pans located on these shelves or racks from which it passes to sub-assembly benches contiguous to them and located in the assembly departments. The tote pans are of different colors to indicate whether the material is for use on army, navy, or other orders. On the sub-assembly benches the various parts are assembled into sub-units as they continue their eastward journey through the plant. The sub-assembly benches are generously spaced so that the men have ample room for their work. In the assembly department east of the sub-assembly tables are two parallel main tracks running north and south on which assembly stands travel, one track being for Wasp, the other for Hornet motors. Assembly of the engine begins at the south end. Three-quarters of the floor nearest the stock room is devoted to the assembly, the balance being used for tear-down inspection and rebuilding after the first run-in of the assembled engine.

Assembly Stands Pass Progressively to Various Sub-Assembly Benches

At the work-benches on the aisles, the various component assemblies are carefully fitted and checked, and fed into the production line



as the assembly stands pass. The main or heavier assemblies, which form what might be called the foundation of the engine, consist of crankcase parts, crankshafts and connecting rods. The engines are made of five crankcase sections, the rear section mounting the accessories, the blower section containing the induction fan and its gearing, the main section being composed of two matched forgings, and the nose section, which holds the thrust bearing and incloses the cam.

Operations begin on the rear section at the first assembly bench. The cored oil passages are sealed, oil pipes installed and studs for accessory mountings are turned in. This operation finished, the assembly stand is pushed along to the next assembly bench where the blower section, which is also the mounting section of the engine, is put together. The induction fan, its shaft and

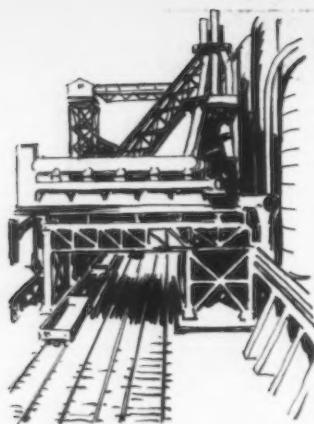
gear train are mounted in this part. The blower is then bolted on to the swivel assembly stand through the mounting bosses as it would be in a plane and the accessory section is put in place. Bushings for the accessory drive-shafts are fitted and reamed, the drive-shafts and gears installed, the oil pump and magneto mounted and the other accessories put on.

At the next bench, the main crankcases are assembled, the rear half of the crankcase being bolted to the opposite side of the blower from the accessory section. When this is in place, the crankshaft is inserted, the connecting rods fitted, and the crankshaft rear gear with the induction fan clutch added. The front half of the main crankcase is next bolted on, the oil-bearing bracket is secured, and the cam and cam drive gear with adjusting sleeves are slipped over crankshaft. The nose

(Concluded on page 202)

THE Assembly Department, with the Assembly Stands and the Sub-Assembly Benches, in the Rear, Is Shown Above. A general view of the main aisle of the Pratt & Whitney aircraft plant is shown below





Tests Show Effect of Using Alloy Scrap in Making Pig Iron

By E. K. SMITH and H. C. AUFDERHAAR*

USE of alloys in steel and cast iron is increasing at an extraordinary rate. Hence ferrous scrap metals will soon reach the market bearing ever increasing amounts of alloys. This problem is not nearly so acute now as it will be in the future, but already the technical sessions of our leading associations are replete with rumblings from foundrymen and blast furnacemen arguing the use of scrap in the blast furnace. Even among the foundrymen there is lack of agreement, some favoring, some opposing, the use of scrap in making their pig iron. In particular, the fear has been expressed that alloy scrap will be used in blast furnace practice to the extent that the quality of pig iron will be seriously affected.

Effects of alloys added to gray iron mixtures have been studied extensively, and results are available in the literature. As stated above, there has been much argument on the possible effects of alloys introduced

in the furnace burdens, but little direct data are available. It seemed to the authors that one way to approach the subject would be to study the direct effect of alloys on the pig iron itself. If we know more of our pig iron, possibly we shall be able to predict in advance the effect of different kinds of pig iron on our castings. The foundryman has been compelled to judge the quality of pig iron by long, and sometimes expensive, practical trials. He will not be satisfied with this method much longer. It did not take him long to realize the value of chemical analysis of his pig iron, and what he needs now is definite information as to the quality of his pig iron, before he melts it. A great step in this direction has been taken, through the work of Boegehold and others, on the quality of pig iron.

It is the purpose of this paper to deal briefly with the effects of small amounts of the common alloys on the characteristics of pig iron.

*Birmingham, Ala.



NORMAL graphite structure in unalloyed pig iron is shown in Fig. 1 (left). Chrome-nickel pig iron in Fig. 2 (right) has finer graphite and greater hardness.





CHROME pig iron, with very fine graphite, shown in Fig. 3 (left) is still harder than the chrome-nickel iron. Fig. 4 (right) illustrates the characteristic whorl structure of molybdenum pig iron.



At least a million automobiles are scrapped yearly, and the amount of alloys which they contain is increasing steadily. The large-scale use of stainless alloys is a new development which complicates the problem. The conservation of our diminishing ore reserves demands the most efficient use of all scrap metals. Therefore it is essential that the scrap automobiles be remelted, and in such a way as not to be detrimental to the resulting pig iron, or castings. The problem of the worn-out automobile is of interest to automobile manufacturers, scrap dealers, blast furnace operators and foundrymen.

How the Experiments Were Conducted

As a basis of experimental work several kinds of pig iron were used. The melts were made in crucibles, as it was desired to have all conditions as uniform as possible, and it seemed probable that losses of alloys would be too variable if the cupola were used for melting. Procedure was simply to melt a definite amount of one lot of pig iron in a crucible, then to pour a standard transverse and tensile bar, at 2500 deg. Fahr. Then a definite amount of one alloy was added and the melt stirred thoroughly. When the pouring temperature was again reached, another set of test bars was poured. The amount of alloys used in most cases was slightly more than one would expect to find in pig iron made with a considerable proportion of alloy scrap.

All melts were analyzed for actual proportion of alloy retained in the melt. Results given below are representative of the effects of common alloys on pig iron with following analysis:

Per Cent	Per Cent
Silicon.... 1.61	Phosphorus. 0.74
Manganese. 0.62	Total carbon 3.66
Sulphur.... 0.034	

Pig irons of different analyses showed correspondingly changed effects. That is, irons of high or low silicon were affected in the same general way by alloys, but in differing degrees. Other alloys than those listed below also affect the pig

iron, but are in such small quantities as to be negligible. Such are copper, zinc, tin, aluminum and lead.

What Dilatometer Curves Show

FIGS. 6, 7 and 8 show dilatometer curves of untreated pig iron and two of the alloyed samples. A good deal of information as to the characteristics of pig iron either with or without alloys can be drawn from comparative curves. From the above it will be noted that the unalloyed pig iron showed the greatest expansion, chrome pig, slight and titanium pig intermediate.

Recent papers by Boegehold¹, Portevin and Chevannard² and Lowry³ show that each type of pig iron has a characteristic dilatometric curve and that these curves are found in the resulting castings, although in altered form.

The authors found also that each type of pig iron had a characteristic curve and that these curves could be modified at will by the addition of small amounts of alloys. It would therefore be possible by making dilatometer curves of an alloy pig iron to predict the approximate effect of this pig iron on the castings produced therefrom. For instance, the effect of a given pig iron could be predicted at least as to its effect on hardness, growth upon heating, and grain size of the resulting castings.

Conclusions Reached

1.—Alloy scrap should never be used in making pig iron for malleable castings. Most alloys have a very decided effect on the malleable anneal; in particular, chromium has an extremely detrimental effect even in small amounts.

2.—Where alloy scrap is used for steel-making and foundry pig iron, it would be a great advantage if the blast furnace would furnish the consumer with approximate alloy contents together with the ordinary determinations. This would enable the metallurgist to take precautions when necessary, or

¹ Trans. A.F.A. 1929—page 91.

² Trans. A.F.A. 1926—page 766.

³ Journal S.A.E. Feb. 1927—page 290.

FIG. 5. Titanium pig iron has a large coarse graphite structure.



to take advantage of desirable alloys.

A schedule showing the maximum allowable alloys in any grade of pig iron would also be of use.

3.—The question of possibly oxidized pig iron, due to the effect of scrap on furnace operations, is outside the scope of this paper. It goes without saying that the addition of oxidized scrap in the ladle would be detrimental. In general, the effect of small amounts of alloys introduced in the blast furnace would be as cleansers and deoxidizers of the pig iron.

4.—Alloy scrap and plain scrap must be used in some form. The blast furnace is the proper place for much of the miscellaneous scrap, owing to its desulfurization and deoxidation. It has the additional advantage of diluting to a very great extent any alloys. Such alloy scrap when used in the cupola would give highly undesirable fluctuations in chemical and physical properties.

5.—Many foundrymen are spending considerable sums for alloys, in the improvement of their product. In other quarters there is fear of the effect of minute quantities of these same alloys in pig iron. Considering the small amounts of alloys found in pig iron and their subsequent dilution in remelting, the authors believe that there is little danger of any detrimental effect on the castings. In fact, such effect is far more likely to be beneficial.

Endurance Properties of Rail Steel

To determine the endurance properties of special rail steel tests have been carried out in the United States Bureau of Standards by John R. Freeman, Jr., and R. D. France. The results are shown in research paper No. 182, copies of which may be had at 10c. from the Superintendent of Documents, Washington.

Comparisons were made between heat-treated rails of ordinary chemical composition, medium-manganese rail, both with and without zirconium, and a manganese-molybdenum rail. Results are given also of some tests made on steel from a rail which had developed a transverse fissure and from another rail from the same heat and subjected to similar traffic but without the fissure.

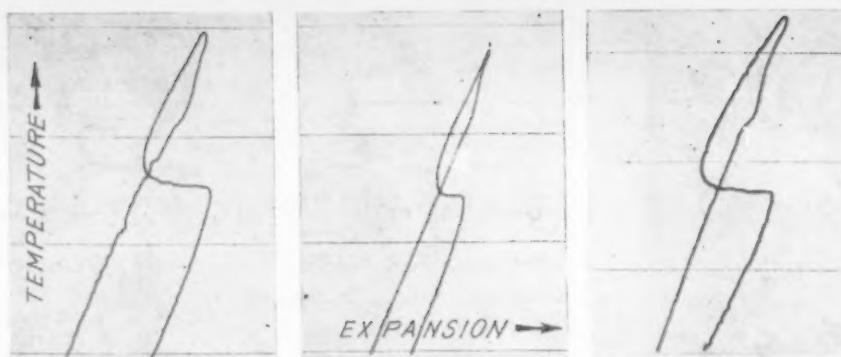


Fig. 6. Unalloyed Pig Iron

Fig. 7. Chrome Pig Iron

Fig. 8. Titanium Pig Iron
THE graphs above show dilatometer curves for untreated pig iron and two of the alloyed samples. Unalloyed iron showed the greatest expansion and chrome pig iron the least.

Heat treatment of rails was found to have increased markedly the endurance limit of the steel. Medium-manganese rail steels were found in general to have a higher endurance limit than carbon rail steel. The manganese-molybdenum rail steel had approximately the same endurance limit as the medium-manganese rail.

The steel in the fissured rail was found to have about the same endurance limit as that from the unfissured rail.

Medium-manganese rails tested averaged about 0.62 per cent carbon and 1.39 per cent manganese. Such a rail with zirconium was a little higher in both elements, containing 0.64 per cent carbon and 1.57 per cent manganese, with 0.09 per cent zirconium. The manganese-molybdenum rail had 0.45 per cent carbon, 1.70 per cent manganese and 0.38 per cent molybdenum.

Carbon rails included the so-called "comparison" rail, with 0.82 per cent carbon and 0.67 per cent manganese, and two rails which were heat treated and subjected to quenches of 30 sec. and 15 sec. respectively. These two rails had carbon about 0.73 per cent and manganese 0.60 and 0.63 per cent respectively.

More than 20 diagrams illustrate the tests as carried out. These are based on the number of cycles of reversed stresses required to produce failure in the steel. The tests were made at varying stresses for different samples, thus giving rise to the curves shown in the diagrams.

Minerals in a Power-Controlled World

At the World Power Conference, Berlin, in June, H. Foster Bain, secretary, American Institute of Mining and Metallurgical Engineers, New York, read a paper on "The Place of Minerals in a Power-Controlled World." In it the questions of the distribution and utilization of the minerals of the world were dealt with in an interesting fashion. The speaker gave two instances of the need for using low-grade ores.

About one-third of the copper production of North America is today mined from ore containing less than 80 lb. of copper per ton, while in the Alaska-Juneau mine, gold ore containing only 87 cents of gold per ton produced over \$4,000,000 last year.

An encouraging outlook for the future of the world's mineral supply is the large quantity of reclaimed metal. Thus, in 1929, half the steel production of the United States, aggregating some 59 million tons, represented reclaimed scrap metal.

Tabulated Results of Effect of Alloys

Number	Tensile Strength, Lb. per Sq. In.	Transverse Strength, Lb.	Brinell Hardness	Alloys Present, Per Cent
1—Untreated pig iron	24,200	3150	179	0
2—Chrome-nickel	24,230	2900	196	Chromium 0.21%; nickel 0.68%
3—Chromium	23,900	3250	207	Chromium 0.28%
4—Molybdenum	28,410	3425	207	Molybdenum 0.47%
5—Titanium	22,885	3000	179	Titanium 0.12%

Tunnel Furnace for Enameling

Central Wall Enables Two-Coat Work to Be Done on Counterflow

Principle, and Special Conveyor Equipment Cuts Labor

Costs to Minimum—Floor Space Conserved

IN the field of finishing or decorating iron and steel products the most successful methods are (1) painting or japanning, baked or otherwise changed into an adherent coating; (2) plating with other metals such as nickel; and (3) "burning on" vitreous enamel coatings at high temperatures. Operations in mass production incident to all of these methods have been fairly well mechanized with the aid of conveyors, which greatly simplify the processes and materially reduce costs. The present discussion is concerned with the process of vitreous enameling by the American Stove Co., the largest manufacturer of gas stoves and cooking ranges.

The immediate operations of vitreous enameling include dipping, spraying, drying and burning. In the modern installation described the necessary units for performing these operations, such as tanks, booths, oven and furnace, are all grouped about a system of traveling conveyors. Temperature controls properly located in the furnace make the process continuous and nearly automatic.

The furnace at the G. M. Clark Division, American Stove Co., Harvey, Ill., combines drying with burning in a furnace of the counterflow, heat interchange type, equipped with two endless chain conveyors also operating on the counterflow principle. It was built by Surface Combustion Co., Toledo, Ohio, and represents what is probably the most modern and efficient furnace operated by the American Stove Co.

As shown in the sketch plan, this furnace is 120 ft. long, while the two conveyor loops are each 187 ft. overall, extending about 33 ft. from the furnace at each end. The furnace is divided longitudinally into two separate heating chambers. Conveyors carry the work through each chamber, and return outside of and parallel to the furnace about 3 ft. away from the

By C. B. PHILLIPS

Vice-President Surface Combustion Co.,
Toledo, Ohio

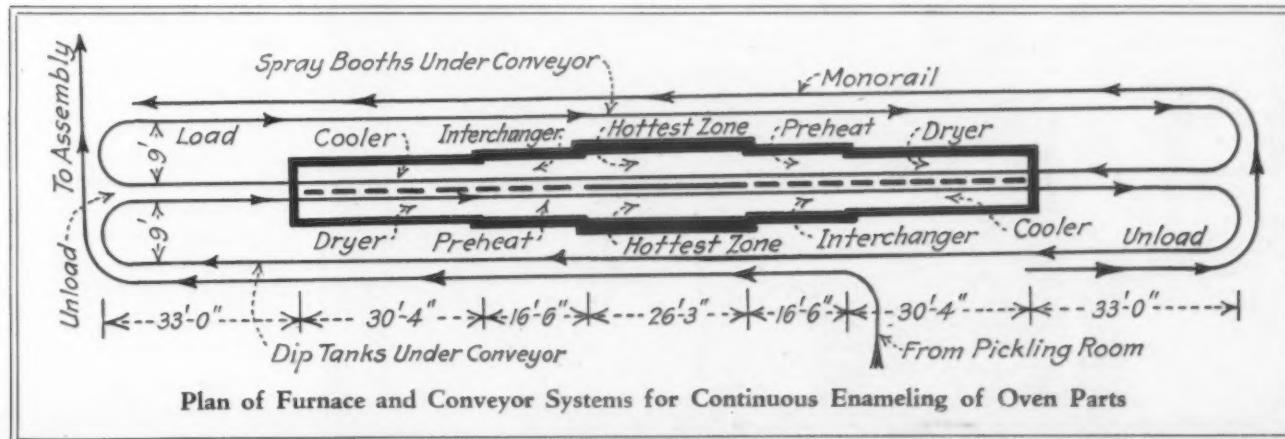
side walls. The dip tanks are located along the free side of one conveyor, while the spray booths are arranged along the exposed side of the other.

Illustrations show that these conveyors are of the overhead chain type with tools or hooks suspended at close intervals and upon which the work is hung while it travels through the furnace. An overhead monorail conveyor, parallel to one of the furnace conveyors, serves to bring work from the pickling room to the furnace, as well as being a means of taking the enameled work away from the furnace to the assembly department.

Furnace conveyors operate around large sprockets with vertical shafts located at both ends of the furnace, each conveyor being motor driven through a separate speed reducer. Speed is so regulated that the work will remain in the furnace the requisite period, varying with its weight and kind of coat. Chains pass along the top of the furnace, in a patented air-tight steel structure, separate from the brickwork, and therefore not subject to severe heat.

Turning to the furnace itself, each longitudinal section of the furnace is divided into five zones, known respectively as heat interchange, preheat, heating, heat interchange and cooling. The two heating zones are alongside each other in the center, but the preheat zone on one side coincides with the cooling zone of the other side. Outside walls are of brick construction, and in the heating section consist of 9 in. of fire brick and 9 in. of insulation, while in the cooling and heat interchange sections only 9 in. of red brick is used.

The heating sections, occupying the middle portion, are 26 ft. long, 4 ft. wide and 42 in. high. The two zones on each side (known as preheat and heat interchange, according to the way the work is traveling),





are 3 ft. 4 in. wide, while the last two coolers are 2 ft. 9 in. wide. The roof consists of 6½ in. of fire brick and 12 to 18 in. of "C-3" concrete.

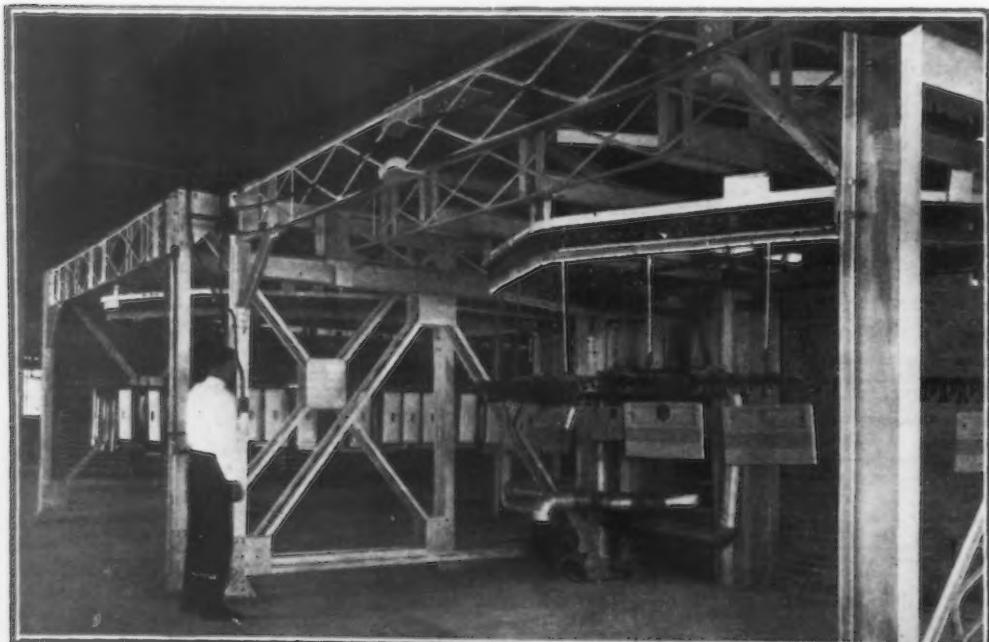
Sheet steel after being pickled thoroughly is brought to the furnace, dipped in ground coat enamel solution and hung on the first conveyor. It then passes through the heat interchange zone, where there are openings in the longitudinal middle wall to allow the heat from the hot outgoing work on the other side to flow in and around the entering cold work. This heat is sufficient to dry the enamel coating. The work then continues through the preheat section where it absorbs more heat from the opposite side and from flue gases, and finally enters the heating zone which is walled off completely from the heating zone on the opposite side of the furnace. Proceeding, it cools and gives off its heat to incoming work on the other side of a porous partition. After the ground coat has

thus been burned and cooled the steel is transferred to the finish coat conveyor so as to burn on the finish coat. These two operations are necessary because each enamel is burned on at a different temperature, the ground coat at 1600 to 1800 deg. Fahr., and the white coat at 1400 to 1600 deg. Fahr.

Firing of each heating zone is accomplished by gas burners with proper inspirator equipment set in the side walls of the furnace. The flame enters beneath an alloy steel muffle located just under the work in the

heating zones. Hot products of combustion flow upward around the sides of this muffle and pass down into a 20 by 22-in. flue, which extends the full length of the preheating zone. This flue then conducts the hot gases through the heat interchange zone and out to a stack at each end of the furnace. In the preheating zone this flue is covered with corrugated steel alloy sheet which promotes heat transfer to the work. (The same arrangement of muffle and flue is located in the other side of the furnace, but is laid in the opposite direction.)

Passage of either hot air out of the furnace or cold air into the furnace through the tool slots in the roof is prevented in a unique way. Every tool shank, where it is attached to the conveyor chain, is equipped with a steel alloy strip, just wide enough to cover the slot and long enough to overlap the preceding and following strips. This affords a flexible but rela-



Discharge End of Enameling Furnace. Piping at door is part of air seal equipment. Heat regulator in middle distance (above)

End of Furnace Showing Conveyor Returns. Work on right is entering furnace; on left is leaving

tively tight seal. Furthermore, the chain itself is housed in a steel casing which is connected to a blower system.

In daily routine, this furnace is shut down at 5.30 p.m. and not lighted until 2 a.m., except to prevent the furnace temperature from falling below 1200 deg. Fahr. Tools are removed from the hooks and the partition doors are closed during this period. Temperature of 1200 deg. Fahr. is always maintained even during the weekend shutdown.

This furnace installation has greatly reduced labor and fuel costs, eliminated the separate drying process entirely, and cut the percentage of rejects. In addition a much smaller floor space for a given production of enamel ware is required than for periodic or batch furnaces.

Visions Release of Sub-Atomic Energy

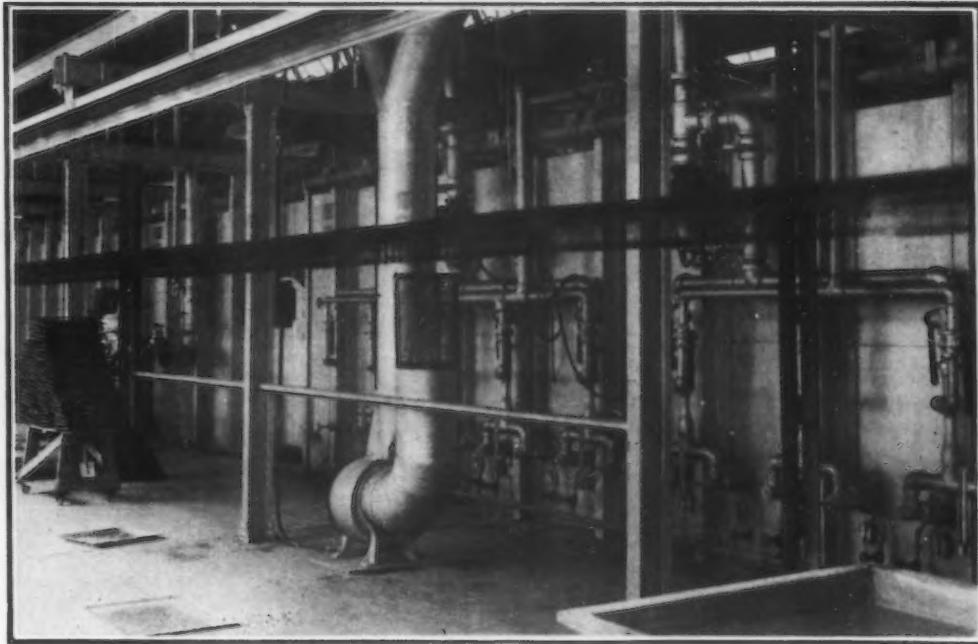
SOME day, instead of pampering the appetite of the monster engine with delicacies like coal or oil, we shall induce it to work on a plain diet of sub-atomic energy. "If that day ever comes, the coal trucks, the barges, the cranes will be no longer needed; the year's supply of fuel for the station will be carried in a teacup, namely, an ounce of water—or of anything else that is handy." So said Sir Arthur Eddington in a lecture before the World Power Conference in Berlin, Germany, June 23. "There seems to be

no doubt," said he, "that the heat and light given out by the sun and stars is supplied from this store."

The more or less understandable thesis of Sir Arthur is in part as follows: We have to distinguish two possible kinds of release of sub-atomic energy. The most drastic method is a complete release of all the energy stored in matter, the matter suffering annihilation by this process. The second method is by conversion of the simplest kind of matter (hydrogen) into more complex elements. The second method releases only 1/100 as much energy as the first, but this would be sufficient to maintain the sun and stars as long a time as is required. It makes a great difference to our theories of stellar evolution which of the two processes is the true source of supply; and unfortunately we cannot find conclusive astronomical evidence for one or the other. The more drastic hypothesis seems on the whole to be preferable.

▲ ▲ ▲
Burner Equipment
for Hot Zone
at Middle of Furnace.
Blower in
foreground han-
dles air for cooling
conveyor chains
above furnace

Large Pipe Han-
dles Air for Cool-
ing Conveyer
Chains Above Fur-
nace. Blower at
rear and upper
piping are for air
for combustion
▼ ▼ ▼





Main Entrance to New Kensington Laboratory Makes Full Use of Aluminum as an Architectural Material. Doors of bright luster contrast with dull gray of cast metal in the frame. A touch of color is given the cornice decoration by brilliant enamel, baked into the recesses of the lynite castings.

Laboratory of Dignity and Beauty

By E. E. THUM

IT is an interesting coincidence—perhaps more than a coincidence—that a monumental work* on "The Aluminum Industry" appears in print at the same time the authors of the books move into a handsome and commodious laboratory at New Kensington, Pa.

In the second volume of the work, S. K. Colby, vice-president, United States Aluminum Co., has this to say in discussing the commercial history of aluminum:

"Probably no single factor has had more influence upon the commercial growth of the aluminum industry

in the United States than the fact that there is but a single producer in America. This has been a knife that cuts both ways. Patent protection, from 1888 to 1909, prevented direct competition. Thereafter the field was open. . . .

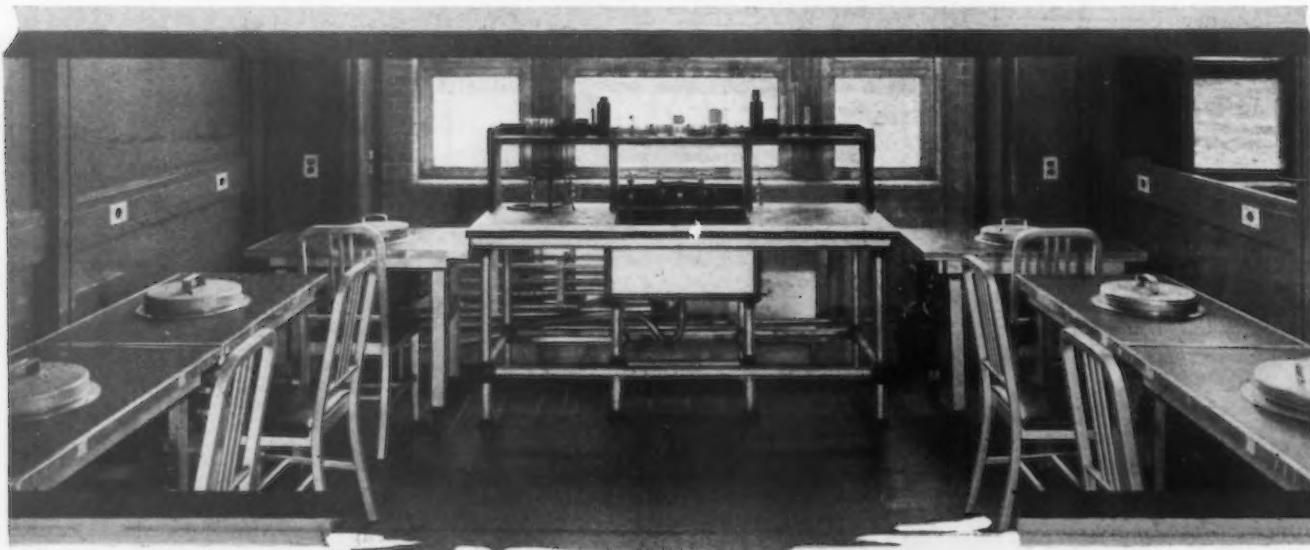
"For 20 years it has been repeatedly charged that an aluminum monopoly was maintained in the United States by the control of all available bauxite. That such a charge is baseless was proved repeatedly by expert testimony and government reports. . . .

"Nor can experience in a business, *per se*, be a firm basis for a monopoly. . . .

"The aluminum industry has had, from the beginning,

*"The Aluminum Industry" in two volumes, by J. D. Edwards, assistant director of research, F. C. Frary, director of research, and Zay Jeffries, consulting metallurgist, with the collaboration of a group of experts from the staff of Aluminum Co. of America.

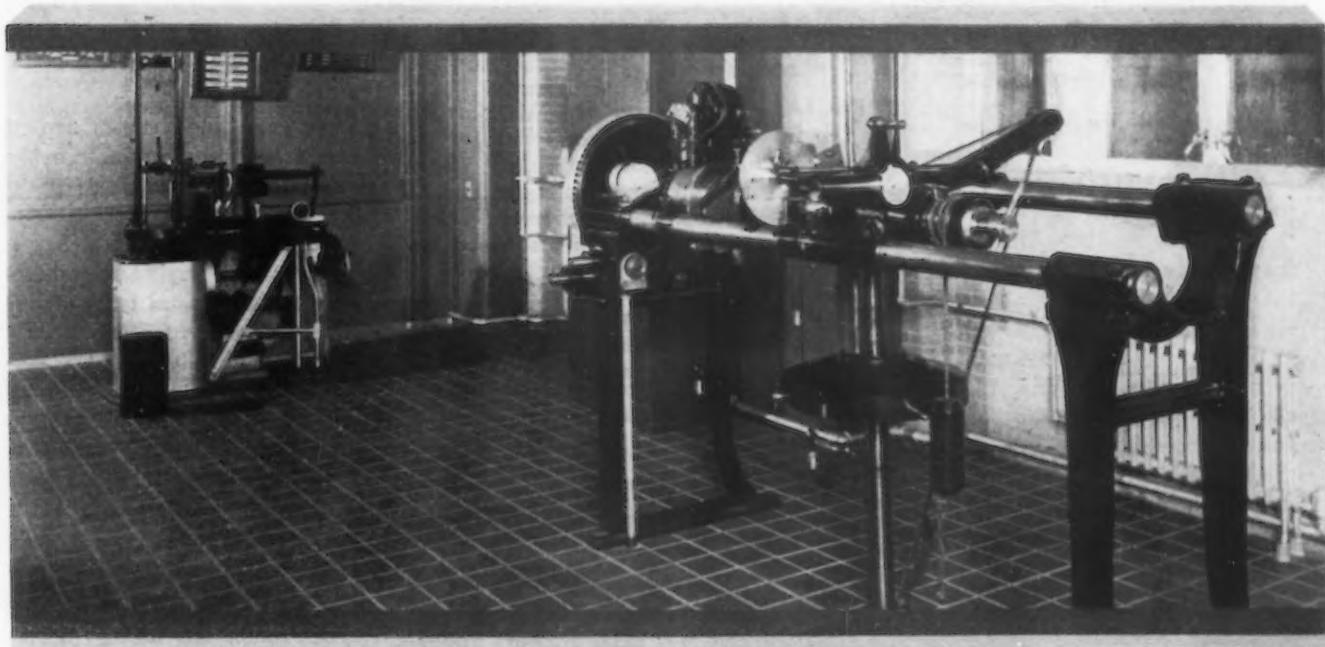
NOT a Single Wooden Chair Can Be Found In the New Laboratory. Aluminum is also used for much equipment, as can be seen in the view of the polishing room for preparation of specimens for metallographic examination



the benefit of painstaking and increasingly thorough research and technical effort. As each new development in scientific knowledge or equipment has been disclosed, its possible application to the advancement of the knowledge of aluminum has been studied. Not only has this research been directed toward the production of the metal, but large sums of money have been spent to determine how the natural properties of aluminum could be adapted to new commercial uses. . . . Few major industries have the advantage of such an intimate knowledge of the product, from the raw materials to the final consumer. . . .

"Regardless of either competition or the natural advantages of aluminum in lightness and durability, the industry must more and more extend its pioneering efforts. Many new products and new lines of con-

ject at times to hidden damage by subsurface corrosion, and of course restricted by a foreign-owned patent. During the war, both in England and America intensive work was undertaken to study the nature of duralumin and to find other alloys which would not infringe patents or which were actually better. In England the "E" and "Y" alloys were discovered by the National Physical Laboratory; the first stronger but too heavy, the latter better at high temperatures but expensive in alloying metals. Later researches directed by Jeffries and Archer of the Aluminum Co. of America's staff developed other types, such as 25S and 51S, which are not only lower in metal cost, easier in melting practice, but have far better workability, and greater scrap value. Discovery of most favorable heat treatments and artificial aging put these alloys on a



sumption must be developed."

A better statement for the reason for the existence of the central research laboratory at New Kensington could hardly be written. In years gone by hundreds of variations in the metallurgical process have been investigated and appraised in that laboratory, and either discarded as valueless, or patented and put into commercial practice, yet this work must go on. In another direction the research on by-products of the ore-refining operation offers large chances of profit. Another improvement of greatest importance has been discovered in the laboratory on the method of beneficiating the crude ore into purified alumina for the electrolytic cell, and the exclusive use of such necessary preliminary steps is equivalent to the protection once offered by the basic patents on the electrolytic process itself.

In the matter of securing better outlets for the metal, consider the problem of strong alloys of aluminum. Duralumin was developed in Germany from research work during 1905 to 1911. It immediately put aluminum in the role of a structural material, with high strength and ductility. From a commercial viewpoint, the early duralumin was hard to fabricate, sub-

Corner of Strength of Materials Laboratory.
In foreground is high-precision Amsler torsion testing machine, of unusual power and with many automatic devices

strength basis where they could compete with the ones developed abroad. Consequently, the Aluminum Co. of America has been able to offer its customers alloys which have definite advantages over the corresponding ones produced abroad.

Research Advantageous in Discouraging Competition

Such citations could be elaborated and multiplied to prove the point that while the Aluminum Co. of America has no monopoly on electrolytic processes, raw materials, markets, business ability, research, or developmental ideas, it has the unique distinction of adopting early in its history the fundamental premise that it must know more about its processes and products than any competitor or any customer, here or abroad. Such an ideal required intensive and continuous research, which has been undertaken and properly supported, and the result today is that the Aluminum company has such an accumulation of experts, information and experience that it has a long head-start over any other organization which wishes to compete—such a long handicap, that much possible competition is discouraged before it commences.



The new laboratory is set on a hill overlooking New Kensington, where much of the manufacturing activity of the company has been concentrated since 1891. In the past the central research laboratories were housed in various buildings in the crowded plant area. Now the commanding size and the general appearance of the new building impresses the visitor with the feeling that science and research has at last been rewarded with quarters in keeping with its influence on the commercial success achieved by the parent company.

Aluminum has been used in the building itself to an unusual degree, not only for utilitarian but for aesthetic purposes. The doors at the main entrance are of wrought aluminum; the door frame and lintels of cast aluminum. Spandrels under windows are aluminum castings, as is also the cornice ornamentation, with recesses highly colored with baked enamel. Win-

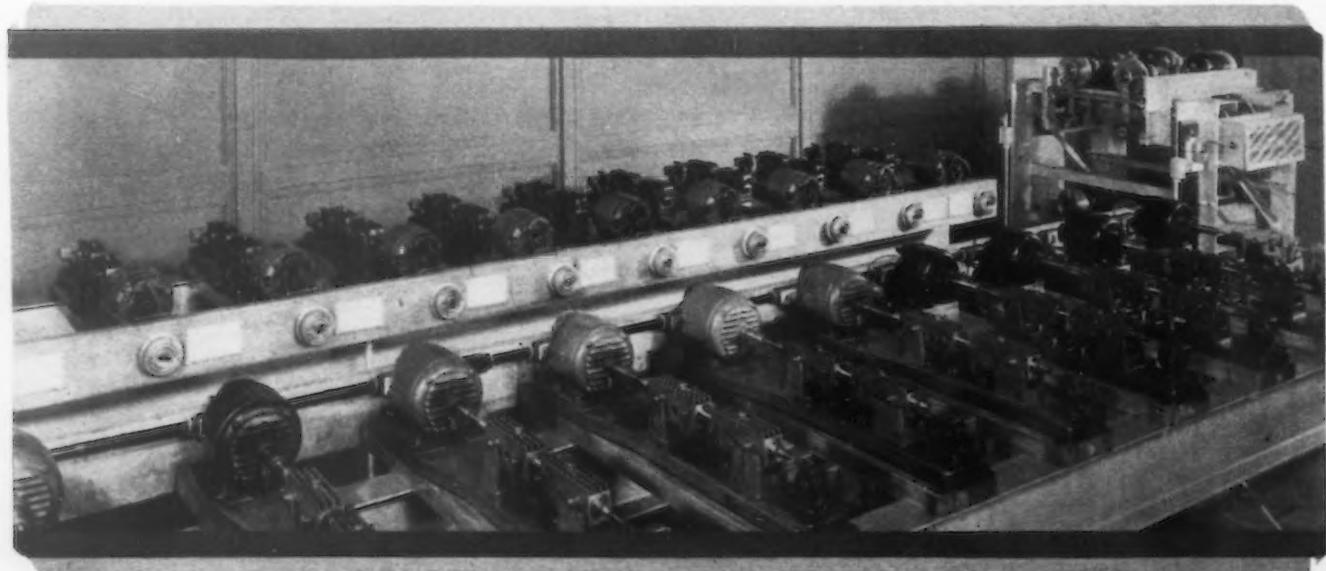
SPECIALIZED Researches Are Carried Out in Well-Fitted Laboratories for Individual Workers. All-aluminum cabinet work under the Alberine table is expected to withstand laboratory atmospheres. Aluminum piping and fittings are also used for hot, cold and distilled water (Above)

Batteries of Fatigue Testing Machines Run Continuously to Determine the Endurance Properties of the Strong Alloys (Below)

dow sash and frames are of fabricated aluminum. In the main hall the metal strips in the terrazzo floor are aluminum—a new use which required some preliminary laboratory investigation to produce metal which would not react chemically with the setting cement. Elevator doors of hand-hammered aluminum are objects of great beauty, as are also the metal furniture and radiator covers in the main conference room. Stair treads and balustrades of the white metal are among the other architectural details.

Much aluminum has been used in the individual laboratories; chairs, balance cases, cupboards, doors and drawers under analytical tables, hot plates, piping for hot, cold and distilled water. Major equipment of aluminum includes the passenger and freight elevator, and a 3-ton traveling crane in the structural laboratory.* The illustrations will serve to give an idea of the provisions made for the 250 scientists and technicians employed.

*A discussion of the use of strong light alloys for traveling cranes was printed in THE IRON AGE, June 5, page 1689.



Business Recovery Is Not Far Off

Conditions of Depression Have Fostered Pessimism, but
Barring Unforeseen Unfavorable Developments Gradual
Improvement Should Soon Set In

BY DR. CHARLES O. HARDY

THE best that can be said of the business record of the past month is that it is no worse than that of the two preceding months and no worse than the expectations of most of the community. Most measures of business activity showed a falling tendency in June, and the record of the closing days of the month was poorer than that of the first part; so that the probabilities favor some further decline in July. In large part, of course, the declines are such as usually occur in this season of the year; whether the falling off is rated as greater or less than a normal seasonal decline depends on the judgment of the person making the estimate. In any case the record is disappointing, since the low level of activity in April and May made it reasonable to hope for at least less than the usual seasonal decline in June and July.

The failure of business month after month to show any definite signs of recovery, together with the extremely unfavorable reports from abroad, has induced a decided increase of pessimism. No one now forecasts improvement before September; as between that date and a later one the choice seems to depend chiefly on the optimistic or pessimistic bias of the forecaster. The fact is that the community's judgment of the outlook for business activity and prices (and for pretty much everything else) is much more influenced by the actual course of events over the months im-

mediately preceding than by any weighing of favorable and unfavorable factors. When prices have been going up it is hard to believe that they will not continue to go up; when business has been bad it creates a presumption in favor of worse business ahead.

Favorable Factors Still With Us

Six months ago it was easy to get a hearing for an argument for early recovery. Six years of prosperity, interrupted only by the minor recession of 1927, had created a bias in favor of continued prosperity. Now, after seven months of depression, the presumption is all the other way.

It is as easy as it was at New Year's to point out favorable conditions—money is cheap; raw materials are cheap; labor is abundant; consumption has been running above production in most lines, so that total stocks must have been reduced even though visible stocks may have increased; crop conditions are good; tax rates have been lowered; and the Government has entered upon extensive operations designed to stimulate business activity; the fiscal year ends with a surplus; Congress has adjourned.

Depression Has Accentuated Pessimism

All these are factors that look to the future, and it is difficult to see any offsetting factors that point

toward a further decline in business activity. Yet all these factors now carry less weight than do evidences of present depression. Unemployment, low production in basic lines, low railroad earnings, large stocks of basic raw materials and low prices are cited on every hand as reasons for anticipating a prolonged business depression. Yet these all look to the past. They are evidences that business is bad now or has been bad in the recent past; they throw no light on the date of its probable recovery. They have characterized every depression in the past and characterize it in greatest degree at the moment when recovery begins.

It must be admitted, however, that much the same thing can be said of the factors listed as favorable. Low interest rates, low business costs of every description and an excess of production over consumption characterize all depressions, short or long, and of themselves throw little light on their probable duration.

How Recovery Comes About

Depressions terminate in two ways—sometimes an up-swing is generated by events outside the ordinary course of business events, like the rush of the demand from warring nations for munitions and foodstuffs in 1915, and the combination of good crops in this country and short crops abroad which characterized 1879, 1891, and 1924. In these cases recovery is very rapid, and business

Indicators of Outlook for Business Activity

FAVORABLE

Transportation efficiency high
Labor abundant
Low costs of raw materials
Low cost of money
Improved bond market
Production has been curtailed more than consumption
Political outlook tranquil
Shippers forecast improvement in demand for cars (slight)
Crop outlook good
Government's fiscal situation favorable
Decreased inventories of groceries, hardware, textiles, automobiles

PARTLY FAVORABLE AND PARTLY UNFAVORABLE

Depressed condition of foreign centers producing raw materials
Depression of farm prices

UNFAVORABLE

Stock market depression
Overbuilding, particularly in residential field
Pessimism, accentuated by seasonal dullness

statistics afford no aid in forecasting the time of its coming.

In other cases recovery is generated by the conditions of the depression—the exhaustion of surplus stocks, the pressure of idle funds, idle plants and idle men for employment even on unfavorable terms, the elimination of weak spots in the business structure generated by a previous era of speculation and the rationalization of technique and management. In these cases recovery is more gradual and ought to be predictable if claims for the completeness of our statistical information and the adequacy of our forecasting technique are justified. Indeed, in very large part the expansion of the statistical activities of the Department of Commerce, the Reserve system, the Department of Agriculture and numerous private agencies has had as its direct purpose the improvement of our ability to forecast the course of business through observation of the accumula-

what conditions now are, and the conditions that make for increased or decreased activity in the near future.

Conditions Not So Bad as in 1921

The factors listed as indicators of the present situation speak for themselves and have been emphasized by every writer on current conditions. They reflect a condition only slightly better than the worst conditions of 1924, though not yet approaching the depth of stagnation of 1921. (For 13 consecutive months in 1921-22 production ran as far below normal as it has in any single month of the current depression.)

Employment conditions as reported to the American Federation of Labor showed no change in June from May; the average percentage of unemployed being reported as 20, compared with a peak figure of 22 per cent in February. The comparable figures for 1928 and 1929 are 11 and 9 per cent respectively. The Census figures

year. This comparison is slightly less favorable than it appears at first glance, because in the third quarter figures comparison is made with a 1929 record that itself reflected some slackening of business activity.

Low Raw-Materials Prices No Bar to Recovery

Of the items listed as significant for the future of business, only two call for comment. The low prices now received by foreign producers of such basic materials as sugar, rubber, coffee, silver and wool are fundamentally favorable. Temporarily they are a disturbing element because they do lead to some curtailment of our exports. But basically they reflect an improvement in the ratio of the exchange of products in our favor. If we paid more for these goods we should get part of it back in the prices of our own products sold abroad, but we could not get it all back in that way.

Much the same thing is true of the farm situation. The idea that we cannot have industrial prosperity without a favorable ratio of farm prices to other prices is a myth. The prosperity of the farmer is a proper objective of national concern on its own merits, just as is the prosperity of any other group, but it is not essential to a high degree of industrial activity.

In summary the favorable factors in the outlook still seem to the writer to outweigh the unfavorable. The only real reason for predicting a further decline is the fact that we have had a decline. Enough bad news is already in to insure a bad report for July, but we see no more reason for putting the bottom in September or October than for putting it in July or August. If no new and favorable unpredictable factor comes into the picture, recovery will be slow, which means that we shall have several months of dull business. But if no new unfavorable factor comes in we see no reason why business should not get better before it gets worse.

Indicators of Present Business Activity

FAVORABLE

Bank debits outside New York now running above last year

UNFAVORABLE

Declines or stability at low levels in:
Employment
Prices
Money rates
Building contracts
Car loadings
Volume of industrial production
Foreign trade
Large stocks of basic materials
Numerous failures

tion of excess stocks, thereby making possible an earlier and less drastic adjustment.

Statistical Information Still Inadequate

The events of the last few months, however, make it clear that we have not yet built either a body of information or a technique of interpreting that information which is at all adequate to the task. It is still possible for hidden surpluses to pile up in the economic system. In large part the over-optimism of last winter was generated by the belief that hand-to-mouth buying had caused such a diminution of current inventories as to make impossible an extended excess of consumption over production.

What was overlooked was that stocks in manufacturers' and distributors' hands might remain small while excessive stocks were accumulating at both ends of the line. Excessive raw-material stocks had accumulated—largely outside the United States—while instalment buying had probably loaded consumers up with inventories in large part equivalent to those accumulated in middlemen's hands in former booms.

In the accompanying summary of the business situation a distinction is drawn between the evidence as to

on unemployment released recently show that most current estimates of the volume of unemployment are greatly exaggerated; this fact, however, throws little light on the severity of the business decline, since we have no figures for preceding years to serve as a basis of comparison.

Increase in Volume of Check Payments

The only evidence of real improvement in the current reports is the fact that check payments are now running above the figures for corresponding weeks of 1929. Considering the enormous decrease in the volume of payments on the stock exchange, it is evident that there has been considerable revival of activity in some fields outside the scope of most of our business reports. Building contracts show much the same tendencies as in previous months, with public enterprises and public utility contracts showing gains over a year ago, and residence construction lagging far behind. Car loadings continue to run very low. The Regional Advisory boards forecast a freight car demand for the third quarter 6.5 per cent below last year. This compares with an actual falling off of 9.3 per cent for the first half of the

Malayan Tin Company Stops Operations

Kampar Malaya Tin Dredging, Ltd., the second Eastern company of the Anglo-Oriental group to stop production, has announced complete cessation of operations for the two-month holiday recommended by the Tin Producers' Association. It is added that the company is prepared to extend this period if the desired reduction in stocks has not taken place at the end of that time. Kampar Malaya is one of the lowest cost Malayan producers of tin. The company's accounts for 11 months of operations to March, 1930, show operating expenses of £65 (\$316.29) per ton, while the average price of tin during that period was £190 (\$924.54) per ton.

Expects Further Decline in Production

BY LEWIS H. HANEY

Director, New York University Bureau of Business Research

OUR adjusted index of steel production has been revised to include more recent years. This revision has the effect of somewhat raising the upward trend computed from the steel production curve, and thus reducing the level of the adjusted curve. The new computations indicate that steel production is now well below estimated normal. The revised index for June makes the ingot output 91.4 per cent of normal, against 91.7 per cent in May, and 133.8 per cent a year ago, which was the peak.

Production, however, is not now—nor was it even at the December low point—as low as in 1924, and does not approach the low levels of 1921.

Unfilled orders of the Steel Corporation in June declined a little less than usual for the season. They are now 98.3 per cent of the average for 1923-1927, which compares with 97.5 per cent at the end of May and 105.5 per cent a year ago. As production has been sharply curtailed and shipments presumably reduced it is doubtful if this indicates any increase in new business.

Less New Business; Lower Prices

With production of steel much less below normal than is the activity in the chief consuming industries, and with new business probably reduced, steel prices have naturally weakened. THE IRON AGE composite in June averaged 87.2 per cent of the average for 1923-1927, against 88 per cent in May, and 95.6 per cent in June, 1929. And finished steel prices are far above their average relation to Bradstreet's index of general commodity prices.

Pig iron production in June was just about on the computed trend line. It may thus be called "normal." Nevertheless, pig iron production, under present circumstances, seems too high to allow firm prices.

The following facts should be noted:

(1) Steel production is relatively lower in comparison with its long-term trend. (2) General business activity is considerably below normal. (3) Pig iron production is not so low as it was even in 1927, and is far above the low point reached in 1924—to say nothing of 1921. (4) The steel scrap market still shows some weakness. It is no wonder, therefore, that THE IRON AGE composite of pig iron prices during June averaged only 81.6 per cent of the average for 1923-1927, against 82.2 per cent in the preceding months, and 87.2 per cent a year ago.

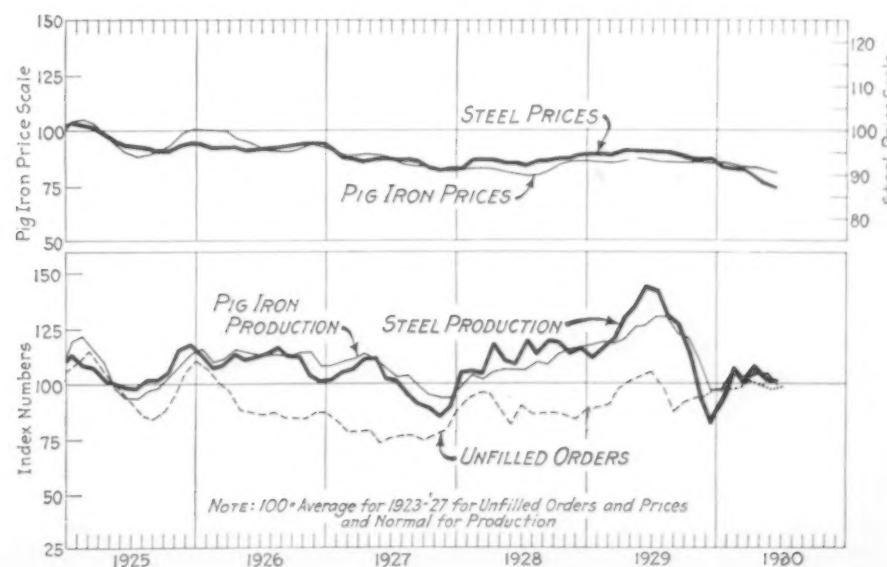
Some significant facts bearing on the demand for iron and steel are as follows:

(1) Building permits and contracts awarded (floor space) declined more than usual in June and are still at very low levels. (2) Automobile production in June declined with unusual sharpness, and it is quite evident that a further recession in this industry is under way. (3) Railroad freight traffic and earnings continue to decline. (4) Manufacturing of agricultural implements and machinery is in a slump and dealers appear to be somewhat overstocked. (5) Various barometers which are significant as bearing on the trend of the steel industry point downward, including machine tool orders, sales of steel sheets and the P-V line.

We venture to forecast a further more-than-seasonal decline in production, and continued irregularity in iron and steel prices, with weakness predominant. Why should steel production not fall to levels reached in the less serious recession of 1924? Why should there not be a final period of price cutting, when steel business does develop in greater volume, as has so frequently been the case in past periods?

No turn is yet indicated in the pig iron market, but further reductions seem probable. Steel scrap prices are probably nearing bottom. Further weakness is to be expected in July and early August, but the chances seem good that scrap markets will be stronger by September.

A More-than-seasonal Recessions in Steel Production May Be Expected, With Continued Price Weakness. Further reduction in pig iron prices seems probable



This Issue in Brief

Hand-to-mouth buying and large stocks can go together. Last winter's optimism over low stocks was misplaced. For what was overlooked was that stocks in manufacturers' and distributors' hands might remain small while excessive stocks were accumulating at both ends of the line.—Page 166.

* * *

Loss of hot air in tunnel enameling furnace, through slots for hooks attached to overhead conveyor, is prevented in a unique way. Each hook is equipped with a steel alloy strip, just wide enough to cover the slot and long enough to overlap the next one.—Page 160.

* * *

How will business recovery come about? Depressions terminate in two ways, says economist: (1) Sometimes an up-swing is generated by events outside ordinary course of business, as, for example, a war; (2) by exhaustion of surplus stocks and pressure of idle funds, idle plants and idle men for employment.—Page 166.

* * *

Electric steam generator solves problem of heating to the proper temperature a compound used for screw-driver handles. Temperature of the superheated steam can be controlled very closely, and by means of reducers different temperatures can be obtained.—Page 146.

* * *

Favorable business factors outweigh the unfavorable, in the mind of Dr. Hardy, business economist. But even if no new unpredictable factor comes into the picture, recovery will be slow, which means we shall have several months of dull business.—Page 166.

Alloys in pig iron worry founders. It may soon be impossible for the blast furnace to avoid charging alloy-bearing scrap. Metallurgists find that effect of a given pig iron can be predicted, as to hardness and grain size of castings.—Page 157.

* * *

Foreman must foresee emergencies. He must set up a reserve for machine failures, for absentees, for spoiled work. He must prepare for trouble, rather than wait until it comes.—Page 144.

* * *

Forming press die breakage is avoided by signal-light system. Special compound, forming screw-driver handle, is pressed around blade. Green light indicates if blades are clamped properly. Pressure is not applied until green light shows.—Page 146.

* * *

If malleable castings are to be satisfactory, do not make them from pig iron made of alloy scrap. Most alloys have a very detrimental effect on malleable anneal.—Page 157.

* * *

No ignition system needed in Diesel engine, for heat generated by high air compression starts combustion. Fuel must be well atomized, and quantity and time of injection must be carefully measured.—Page 149.

* * *

Straight day-work rates only are paid in aircraft engine plant. Cost may be higher, but manufacturer is willing to pay it in the belief that day-work rates promote high quality of workmanship.—Page 152.

'Ware the disgruntled foreman! He will sow dissension in the minds of his men. Obedience is even more important than ability.—Page 143.

* * *

Conserves heat in enameling by dividing furnace longitudinally into two separate heating chambers. Conveyors carry work through all five zones. Heat from hot outgoing work in one chamber is allowed to flow into adjoining chamber and preheat the entering cold work.—Page 160.

* * *

Crankcase of aircraft Diesel engine weighs only 34 lb. One piece, no flanges, no bolts. Construction further lightened by using hoops of alloy steel to hold the cylinders to the crankcase.—Page 150.

* * *

Rapid growth of aluminum industry is largely a laboratory triumph. Large sums have been spent for research; new products and new lines of consumption have been developed. Though the leading aluminum producer has no monopoly on materials, processes or markets, its tremendous advantage in experience and research discourages competition.—Page 163.

* * *

Will steel prices decline still further, when steel business does develop in greater volume? This has frequently been the case in past periods, Dr. Haney points out.—Page 167.

* * *

Fear of deleterious effect of alloys in pig iron on quality of gray iron castings is unwarranted, metallurgists find. Effect is far more likely to be beneficial, they say.—Page 158.

BOOK REVIEWS

Selection of Bonus and Incentive Plans

Wage Incentive Methods. By Charles Walter Lytle. 444 pages, illustrated. Ronald Press Co., New York. Price \$7.50.

This new book by Professor Lytle fills a need that has undoubtedly been felt by many who have tried to compare some of the numerous wage incentive plans, or who have wanted to find the plan which would best fit some particular condition in their plant. He has made comparison and analysis of different plans very easy by reducing all of them to a common base.

In pleasant contrast to the usual book of this type, there is no attempt to show that one plan is superior to any other for all conditions. The 25 plans analyzed have their weak and strong points enumerated entirely without bias, cognizant of the fact that certain plans were designed to fit certain conditions and are most valuable when applied only under those conditions.

The opening chapter of the book discusses the benefits of incentive plans, the degree used, and the field open to them. There follows a classification by production-earning characteristics which is more comprehensive than the usual one of a multiplicity of "bases" with various exceptions and additions.

The chapter on the selection of incentive plans seemed to the reviewer to be very valuable for anyone wishing to select a plan to meet some particular set of conditions. It is well at this point, however, to turn to the appendix, which is perhaps the best part of the book, because it is there that the basis of comparison is formulated and explained.

This discussion on group plans points out the danger of using such applications indiscriminately, since only where all operations within the group are dependent can the full benefits of this plan be realized.

Recognizing the importance of a correctly established basic rate, the author devotes a chapter to the factors influencing its determination. The distinction between real and nominal wages is nicely brought out. The setting of individual job rates and their influencing factors is covered in a general way with several examples illustrating successful applications.

"Installation of Incentive Plans" is treated rather unsatisfactorily from a general point of view, since it is almost wholly devoted to standards used in the No. 1 Barreling House of one of the plants of the Standard Oil Co., and has the objection of any paper using specific figures. It will, however, serve as a general outline for a plan to fit similar conditions by changing all of the standards used.

Analysis of the various classes of wage incentive plans leads to a division into time rate, single piece rate, multiple piece rate, combined time, bonus and piece rate, constant sharing, variable sharing, and empiric plans with and without step bonuses. Incentive plans for beginners, incentive for reduction of waste, quality, safety, and attendance bonuses are discussed separately.

Incentive plans for indirect labor, supervision, and office employees are not treated in such complete detail as are the incentives for direct labor, because of the relative newness and lack of the large mass of data on this type of bonus or incentive. However, it is a clear analysis of the plans studied and will serve as a guide for future development along this line.

The book is truly a reflection of its title; it is good solid reading without approaching the point of dryness. Some advocates of universal application of one type of plan will disagree with parts of the book, but the open minded reader can find little, if any, grounds for disagreement.

LEE R. STALDER.

One-Hundred-Story Buildings

The Skyscraper. A study of the Economic Height of Modern Office Buildings. By W. C. Clark and J. L. Kingston. 164 pages, 6½ x 9¼ in. American Institute of Steel Construction, New York. Price \$2.

This book is a valuable contribution to the literature of structural engineering. Not only is the skyscraper studied from the economic side but the indictments that have been drawn up against it are fully and fairly considered.

At what height does the skyscraper cease to be a profitable investment? Charts and tables are given showing the effect of height on gross and net income of 185 office buildings (the Shultz Chart), the net return upon total investment for varying building heights, the net return upon investment with varying land values, the cost per square foot of net rentable area, and kindred subjects.

In computing costs the building code and zoning regulations of the city of New York were followed. As the present tendency is to build very tall buildings over large areas of ground a plot 200 ft. by 405 ft. with an assumed land value of \$200 per sq. ft. was taken, and designs were made for eight different buildings varying in height from eight to 75 stories. In arriving at conclusions, engineers, architects, builders and rental agents, each recognized authorities in their respective fields, were consulted. The normal computed percentage return upon investment was found to vary from 4.23 per cent of the 8-story building to a maximum of 10.25 per cent for a 63-story building. For a building of half this size with the same land value, the economic height would be reduced to about 40 stories. For buildings on irregular shaped plots and low land value the economic height would be reduced beyond any calculations made in the book. As stated in the concluding chapter, "True economic height is the resultant of a great many variable factors, of which the two most important are the size of the plot and the value of the land. Such economic height must be determined as an individual problem for each particular site." The authors of the book are to be commended for their lucid treatment of the "variable factors" that enter into the construction of a skyscraper.

The largest single item in the cost of a building is the steel framework, varying from 8 to 15 per cent of the total cost (exclusive of the land); it may be fairly stated that it is the use of structural steel that has made the skyscraper possible. The tonnage of steel computed for the foregoing buildings ranges from 4433 tons for the 8-story building to 26,900 tons for the 63-story building—that is, about 1 lb. to 1.82 lb. per cu. ft. of building volume.

It should be noted, and this is important, that these figures apply only to buildings of the size on which the studies were based. The cost of structural steel erected is a composite of four outstanding items. The first item, floor steel, bears a constant ratio to the gross floor area,

(Continued on page 203)

Save 18 Lb. Container Shipping Weight

Experience of Hibbard, Spencer, Bartlett & Co. with Wirebound Packages

AVOIDABLE costs in the packing, transportation and handling of goods resulting from the methods of distributors and manufacturers are discussed in a recent monograph by C. J. Whipple, president, Hibbard, Spencer, Bartlett & Co., Chicago.

The average weight of the company's shipping boxes, which was 30 lb., was reduced to 12 lb., effecting a net average saving of 18 lb. in the shipping weight of each outgoing package of hardware items. "While

although pine, gum, cotton wood and other woods are used according to supply. A feature of direct interest to our trade is the remarkable average weight reduction of 60 per cent, effected by thinning the box walls. While this may seem inconsistent with its cargo of hardware, the box-wall thinness is more than compensated by a series of overlying steel binding wires which hold box and contents together. The wires are stitched to the box before it is set up and



Elevated Conveyors in the Hibbard Packing Department Bring the Boxes to the Overhead Racks and, When Packed, the Floor Conveyor Takes Them Away. The trunk-type lid boxes save 70 per cent of assembly and packing time and an average of 18 lb. in shipping weight.

the freight classifications of our 60,000 catalogued items vary so widely," writes Mr. Whipple, "that no average freight rate may be named, the second class rate covers 'mixed iron hardware,' a common class of shipment. With a second class rate of \$4.43 a 100 lb. to San Francisco, and \$2.20 $\frac{1}{2}$ to Denver, the elimination of 18 lb. from each package means a worthwhile saving for the dealer. This saving in weight and consequently in freight charges which is multiplied from 125,000 to 150,000 times yearly to the advantage of our dealers is made possible through the use of a standardized, all-purpose shipping container of light but safe construction. While many shipments are packed in other than this type of box, they represent the utilization of containers of incoming merchandise and, if extra weight is involved, are sent only to nearby destinations.

"According to our experience, eight stock sizes of our standardized wire-bound shipping box are sufficient to take care of the packing requirements even for our large assortment of items and for orders large and small. The construction is of wood, for the most part resawn birch and birch veneer,

provide the major portion of its strength, also obviating the variable factor of nail-holding strength.

"An example is our bolt box which carries approximately 300 lb. of bolts. It is 12 x 12 x 25 in., with $\frac{1}{4}$ -in. material in the sides and $\frac{3}{8}$ in. in the ends. Cleats and battens reinforce the ends and provide the framework. Five wires hold the assembly together. On reaching its destination the box is opened merely by clipping the wires at the edge of the trunk-like lid."

Some of the packing department employees are on a piece work basis. Because of a 70 per cent increase in individual output and consequent gain on bonus when working exclusively with the standardized boxes, they also make use of the miscellaneous containers which accumulate in the company's receiving department.

As the boxes are 80 per cent assembled before setting up, they are stacked flat. A constant stock is carried of more than 11,000 in the storage space needed for approximately 2500 set up boxes. Assorted sizes are set up only as needed and travel on overhead conveyors to overhead racks within convenient reach of the packers. The light box is easily lifted

down, with the trunk-type lid hinged to the box by means of the binding wires. When finished, a conveyor flush with the floor takes it to the weigher and thence to a spiral chute leading to the shipping platform. While some types of box and package surfaces show a tendency to stick in this metal chute in damp weather, the wires on our regular box are found to insure free sliding at all times.

Questions Involved with Scientific Machine Policy

A simple catechism which a representative of the Department of Commerce told the National Knitted Outerwear Association Convention, June 20, constitutes the A B C of a scientific machine policy, consists of seven questions to be asked by the manufacturer. With suitable local modifications, they would fit the case of machine tools or other machinery equipment of a manufacturer.

1. Is mere age a reliable guide to the time to scrap a machine? (A negative answer is indicated by the Department's findings in Cleveland plants.)
2. Can your present machines produce what you want them to make, as cheaply as other machines on the market?
3. Shall you buy additional machines or will the alteration of new machines be more economical? (It was indicated that the answer to this question depends in no small measure upon the ingenuity of the foreman and the workers in adjusting machines to up-to-date styles.)
4. If you decide to buy additional machines, shall you buy new or second-hand ones?
5. Have you considered the possible effect of what may be excess machine capacity, in your industry, on what has been termed "profitless prosperity"?

6. If you give up the use of some of your present machines, shall you sell them, break them up, or merely store them? The possibility of encouraging uneconomic competition was suggested for consideration in connection with this question.

7. Shall you establish a reserve for future purchase of new machines when necessary?

The speaker emphasized the importance, after determining to one's satisfaction what sort of product will sell best, of knowing the relative production possibilities, including production cost, of one's own machines and of machines that can be bought, of recognizing fully the additional cost which changing styles of products may entail, and of allowing for it fully in determining the cost of production.

Merger of Fabricators

Merger of the Massillon Bridge & Structural Co., Massillon Ohio, with the Fort Pitt Bridge Works, Pittsburgh, has been under negotiation for several weeks and is understood to have been practically consummated. A meeting of the stockholders of the Fort Pitt company will be held July 18 to act on the proposed merger.

High Spots in Power Developments

World Conference in Berlin Served to Focus on Some Unusual Applications

BY RAYMOND H. HOBROCK

THE Second World Power Conference held in Berlin in June has already been accorded the praise of the engineering and scientific world. The 3900 people gathered in Berlin found offered to them much more than it was possible to take in in the short space of the conference; 48 nations offered information in 380 papers dealing with all phases of the power problem and including in them thorough discussions of the means of reducing power costs by greater utilization of the by-products of the process of manufacture.

It is impossible to estimate at this time what real benefits will be brought to the peoples of the world out of this meeting. All of such benefits will never be definitely known, but it will be possible to estimate the value of the scientific and technical advances by noting the progress made along the lines for future development laid out at this meeting, when the Third World Power Conference will convene in the United States in 1936.

What the Conferences Have Covered

The first conference held in London in 1924 more than met the expectations of the most enthusiastic in the way in which the nations responded to this call for the mutual exchange of ideas; the smaller meetings in the various fields held since that time have borne witness to the value of the inspiration and ideas carried away at that time and brings proof of the international feeling for

the necessity for such conferences.

The first plenary world power conference was devoted to the survey of power resources and the progress achieved in the leading countries in the utilization of coal resources for industry, transport and other economic developments. Since 1924 sectional conferences have been held devoted to special aspects of the great power problem. At these meetings the discussion covered the production of electricity from water power, electricity legislation, fuel problems and the administration of public utilities.

The second conference again surveyed the whole subject of power and incorporated the results of the sectional conferences in its deliberations and conclusions. Special emphasis was laid, however, on the distribution of power and the economic factors which govern its utilization. Economic factors have, therefore, occupied the foreground.

Some idea of the care with which the second plenary conference was arranged may be derived from the fact that nearly three hundred of the leading experts in Germany, in cooperation with similar experts in the countries represented worked out suggestions for discussion and for the preparation of special phases in the generation and use of power.

The largest portion of power of the world today comes from steam power plant and the amount of skill and technique that has been spent in the improvement of the efficiency of such

plants is well known among engineers. But there are still many problems to be met, perhaps foremost among these is the problem of equalizing the demand upon the plant or in some way storing energy during periods of low demand and using this stored energy during the periods of peak demand.

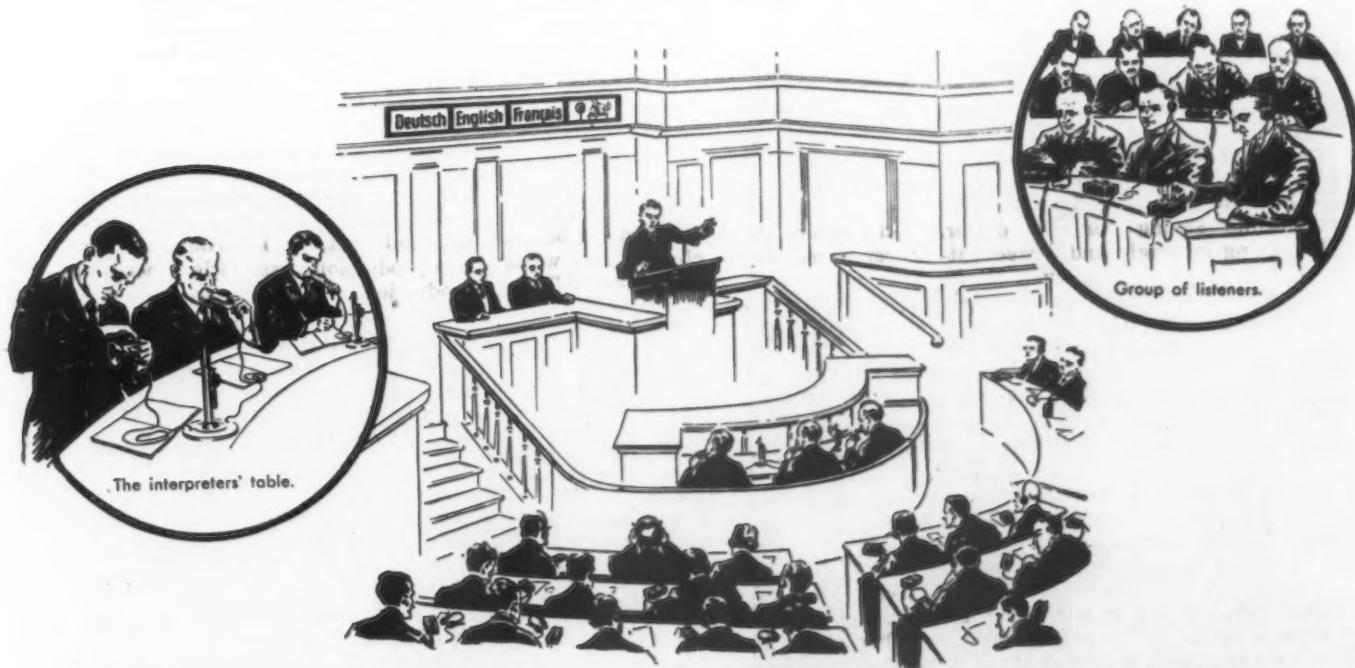
This has been done in two principal ways: In one way, energy has been stored as potential energy by pumping water to higher levels with the extra power during the low demand periods and recovering this stored energy at the required times as water power. This particular device has found considerable application in Germany and other European countries.

A second method is to store the steam itself in high-pressure steam storage plants. The last method is rather new and has not had widespread application, but in those places where it has been installed the reports indicate a satisfactory result. Still another plan, of course, is the coupling of water power and steam plants even at long distances from each other. Sometimes local conditions can be greatly improved by the utilization of rather small water power resources, in that such resources are used only at those times when the demand on the power plant is the greatest.

In Czechoslovakia the heat radiated from blast furnaces and the heat in the tapped off slag is being used in the generation of steam; this particular application is especially well adapted to the preheating of the feed water.

Steam Plant at 3300 Lb. Pressure

The actual operation and control of a steam installation operating at 225 atmospheres (3300 lb.) and 705



SIMULTANEOUS Speech Transmission in Several Languages Featured the World Power Conference Held in Berlin, June 16 to 25. Placed in front of each seat in the auditorium was a pair of headphones, connected to a specially designed switch box by means of which the listener could switch into the language he best understood. The speakers and the interpreters, who translated on the spot, all spoke into microphones equipped with soundproof mouthpieces.

deg. Fahr. was available for inspection at the Siemens-Schuckert Works in the suburbs of Berlin.

One paper from Finland reported the use of gas made from wood in the operation of automobiles, ships, etc. With the scheme used in these experiments it was shown that 1 lb. of wood supplied as much energy in this form as 0.21 lb. of benzine.

The use of Diesel motors for aircraft was regarded as practically assured, since those few experiments which have been made recently have been accompanied with extraordinary success. Indeed, the success of the smaller Diesel motor is such as to convince some that most internal combustion engines will be of that type in the near future.

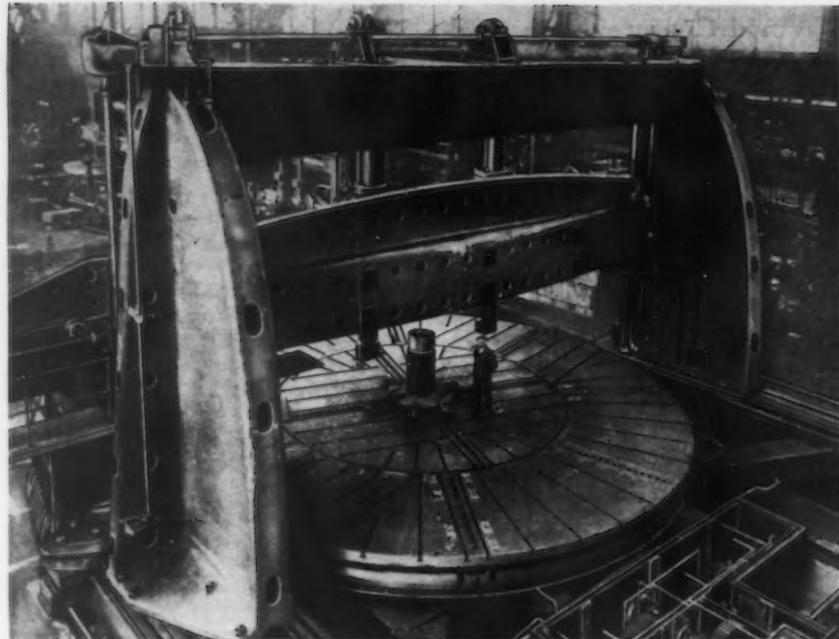
To Utilize Power of the Tides

In the Argentine a unique construction is going on to utilize the tides of the ocean for the generation of power. At the present time two especially favorable places on the coast have been selected. One of them is the Gulf of San Jose. The entrance from the sea into this gulf is about 4½ to 4¾ miles wide and will be closed by a dam with 376 built-in water turbines. Through the tidal movement of the water in and out of the gulf it is expected to gain 10 million kilowatt-hours of power daily.

Special Exhibit to Tell Story of "Machine Age"

The evolution of the "machine age" will be depicted in a special educational exhibit to be held by the Museums of Peaceful Arts in its new headquarters at 220 East Forty-second Street, New York, Sept. 12 to Nov. 15.

This exhibit, according to the announcement, will present a dramatic



AT the Plant of the Schiess-Defries A. G., in Düsseldorf, Visited by Delegates to the World Power Conference, Was Shown a Boring and Turning Mill Designed for a Maximum Turning Diameter of 74 Ft. The diameter of the inner faceplate is 21 ft. 4 in. and the diameter of the annular faceplate, 39 ft. 4 in. Maximum weight of work is put at 300 gross tons and the weight of the mill itself 700 tons

epitome of the scientific discoveries, inventions and machine improvements which in a period of 15 decades have effected a world revolution in industry and society. Almost 100 American corporations, including many machine tool companies, have cooperated in assembling this educational exhibit, work on which has been under way for more than five months.

The story of Man and the Machine will be told through actual machines, tools, and mechanical agencies from early times to the present, and these will be supplemented by motion pictures, photographs, models, statistical

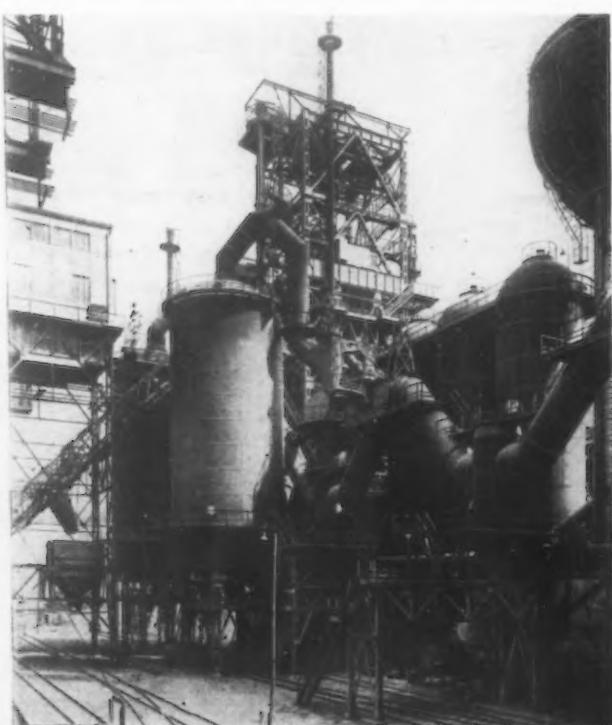
data, diagrams and examples of work of modern artists on mechanical and industrial themes. Many of the machines will be in operation.

It is planned to show, first, "the character and state of mechanical progress up to the turn of the eighteenth century, and to describe the world which our ancestors were able to fashion. The exhibit will then carry through from the beginning of the nineteenth century to the crystallization of American industry and the passing of the pioneering era. A third period will complete the story to 1930.

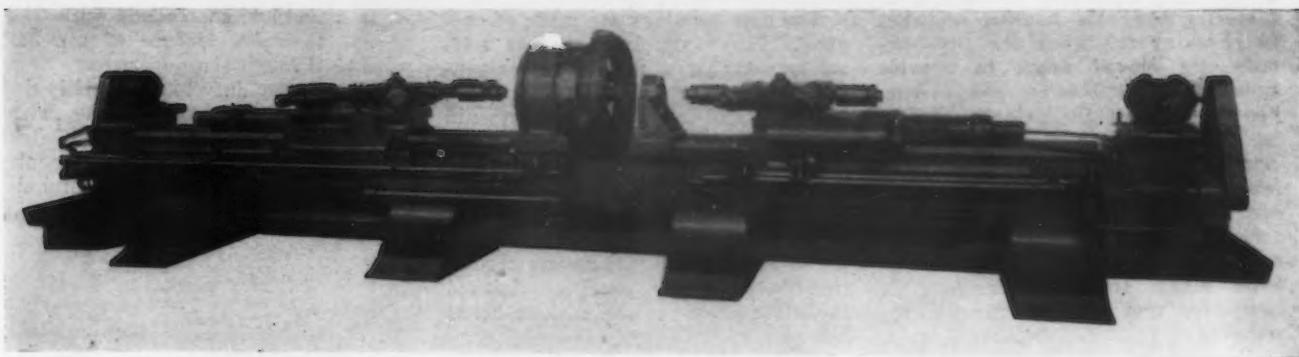
"In their proper chronological or industrial places in the exhibit there will be displayed, in the form of models, machines or graphic devices, early and modern locomotives, telephones, textile and agricultural machinery, presses and printing accessories, sewing machines, automobiles, airplanes, bicycles, radio apparatus.

"Power will be depicted as the life blood of the machine age. There will be shown, in various forms, Watt's steam engine, modern steam engines, the internal combustion engine, electrical current transmission, the development of the central power station, water-power development, and other pertinent items."

The exhibit is being supervised by technical and educational committees, including Dr. F. C. Brown, acting director of the museums; Prof. Charles R. Richards; Prof. Joseph W. Roe, New York University; L. P. Alford, president, Ronald Press; Calvin W. Rice, secretary, American Society of Mechanical Engineers, and Professor Robert H. Smith, professor of machine construction, Massachusetts Institute of Technology. It is being prepared under direction of Roberts Everett Associates, New York.



BLAST Furnace II of a New Plant of the Friedrich Krupp A. G. at Essen - Borbeck, Was One of the Points Visited by Delegates to the World Power Conference in Germany. Besides the dust-catcher, equipment includes what appears to be a heat exchanger for utilizing some of the sensible heat of the gas for warming the blast



Duplex Chucking Machine

Both Sides of Agricultural Machinery Wheels and Ends of Axle Housings Machined Simultaneously

TO permit chucked pieces to be machined on both sides simultaneously, the Foster Machine Co., Elkhart, Ind., has developed a duplex arrangement of its Fastermatic chucking machines.

Two of these duplex machines are here illustrated. One of them is designed for boring, facing, chamfering and turning the bore of wheels for agricultural machinery. The work is chucked on a head located at the middle of the bed and is machined on opposite sides by two sets of tools carried by the two turrets. Accurate alinement and substantial savings in time are claimed for this machine.

Operations on each side of the bore are: Facing the outside of the hub, boring the cavity and facing a flange at the inner end of each bore. This work is divided up into rough boring and facing, finish boring facing and chamfering, and a final reaming. There being three steps in the cycle, each turret is equipped with two sets of three tools each. By this means it is unnecessary to index the turret back to the starting position.

Operation Automatic

The machine operates automatically. A series of cams provides for rapid advance of the tools to the work, change to the required feed movement and then a rapid withdrawal of the tools. The turret is then indexed to the

next station, and the same sequence is repeated. At the conclusion of the cycle, the machine is tripped automatically to a neutral position. After the finished piece has been removed and a new one chucked lifting, the next cycle is started by lifting a control lever located at each side of the head.

Three motors drive the machine, one at each end and one at the back for driving the work-head. The work-head is equipped with sliding gears that provide two speeds.

Feed and rapid traverse of the turret and tools is accomplished hydraulically, the feed movements being secured through an Oilgear unit. For setting up a job, or in case of some abnormal condition, the turret movements may be operated by hand. A safety device on each turret makes it impossible for either tool to be fed into contact with the work unless the turret has been indexed and the turret locking bolt properly seated. This is accomplished by means of a stop on the turret slide.

When the machine is under hand control, as in setting up a job, the turret may be partly withdrawn and then indexed by hand to bring any set of tools into line with the work. The locking bolt does not drop into place unless the turret is withdrawn all of the way and is ready to start on its next forward movement.

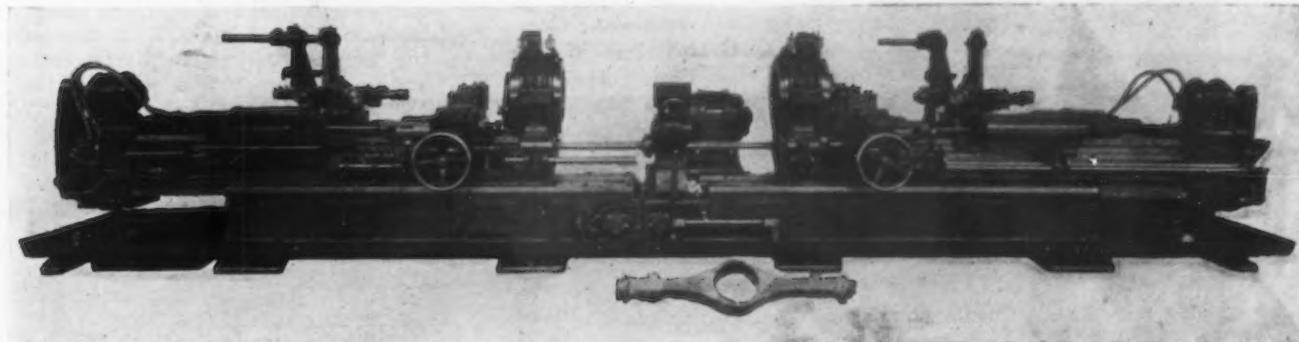
It is claimed that any experienced screw machine or turret lathe operator will have no difficulty in quickly learning to operate this duplex machine. On the job shown, the hub bore is machined in cast steel. The diameter is 3 in., minus 0.002 to 0.003 in. Floor to floor time for machining both sides of the bore simultaneously is 2 min.

Fastermatic for Machining the Ends of Truck Axle Housings

The other 2-F duplex Fastermatic here shown is designed for turning, boring, reaming and facing the two ends of truck axle housings simultaneously. Each end of the housing is also tapped, but since the thread is right handed in each end it is necessary to reverse the rotation of the housing to produce the thread in the left-hand end; therefore, each thread must be tapped separately.

The main bed of this duplex is planed to receive two sub-beds which are free to slide longitudinally. Each sub-bed carries a driving head and a hexagon turret complete with automatic operating mechanism. The two sub-beds are moved apart and together hydraulically, these movements being controlled by a hand lever shown at the front of the machine. A special oil pump is provided for effecting the ram action.

The heads are driven by a single motor mounted on the rear of the machine, the power being transmitted through gears and splined shafts. Two speeds forward and reverse are obtainable. Midway between the heads there is a swinging fixture for



Both Sides of the Bore of Agricultural Machinery Wheels Are Machined Simultaneously on the Duplex Fastermatic Chucking Machine Shown at Top of Page. Floor to floor time is 2 min.

The Machine at the Bottom of the Page Is also of the Duplex Type, But Is Equipped for Machining Truck Axle Housings at Both Ends

centering the axle housing endwise. In chucking the work the two sub-beds are moved apart to provide sufficient space between the driving heads to permit the axle housing to be suspended and centered by the centering fixture. The beds are then brought into position over the work and located by stops. Centers carried forward by the hexagon turrets locate the axle ends concentrically, after which the final clamping is completed, and the centering fixtures removed.

The axle housings are made of cast steel. They vary in length to such an extent that a means of compensating for the variations must be provided, and for this cross-slides are furnished with a hand longitudinal adjustment. Any adjustment made through the cross-slide also makes the same adjustment to the end of the travel of the turret tooling, thereby maintaining the correct relation between the external finished faces and depth of the various bored holes.

It is governor controlled, with the special Hercules feature of air not passing through the governor.

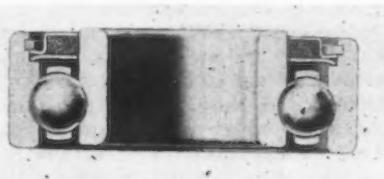
It is a heavy-duty tool especially designed for heavy-duty grinding, wire brushing, snagging and buffing. One of its chief uses is for brushing scale and rust from steel cars and all simi-



lar surfaces. It can be furnished in speeds of 2000, 3100 and 4000 r.p.m. Its weight is 13 lb.

Patented Felt-Seal Ball Bearing

THIS cross-section shows the constructional features and design of the S K F felt-seal ball bearing. The bore and outside diameter are ground to international standard dimensions and tolerances, the same as the corresponding standard single-row bear-



ings. The width is slightly greater, to accommodate the felt seal.

The seal consists of a dished inner steel plate, a removable felt, a dished steel end plate, and a split steel ring fitted into the groove in the outer race to hold the assembly in place.

An outstanding feature of the bearing is the ease with which the seal may be disassembled at any time and new felts applied.

Skilled labor in the building trades in 20 cities is shown by *Engineering News-Record* to average \$1.38 an hour in 1930—the highest rate of the last decade. There has been a steady increase from \$1 in 1922, in spite of the gradual decline in living costs and in average prices of materials. For common labor the average hourly rate is 56 1/4c. in 1930—again the highest of the decade, and comparing with 44 1/4c. in 1922. Building costs are shown to represent, in general, the lowest figure since 1922, in spite of the high labor cost.

Unfilled orders for brass and bronze ingots and billets on the books of members of the Non-Ferrous Ingots Metal Institute, Chicago, totaled 17,516 net tons on July 1.

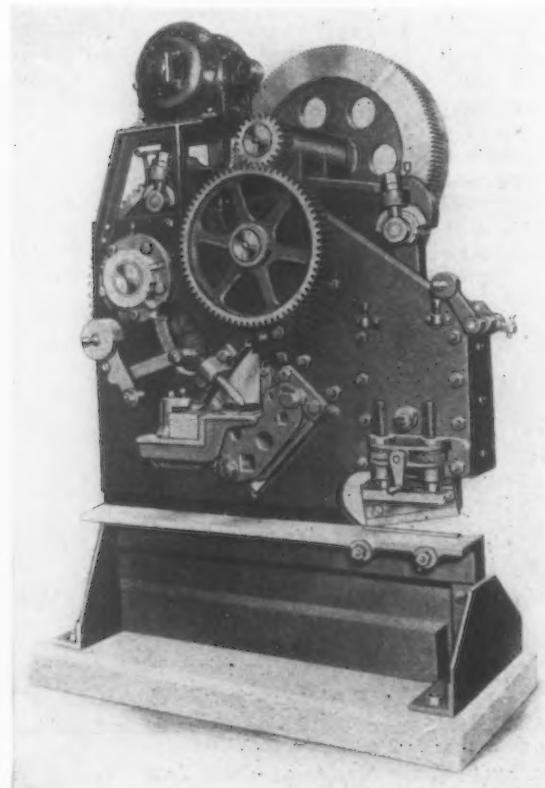
Three Larger Sizes of Buffalo Universal Shears

NO. 2 1/2, 3 1/2 and 4 1/2 universal shears have been developed by the Buffalo Forge Co., Buffalo, N. Y., to supplement the company's smaller universal shears. They are built with the same electrically welded "armor-plate" frames, which are guaranteed for life against breakage.

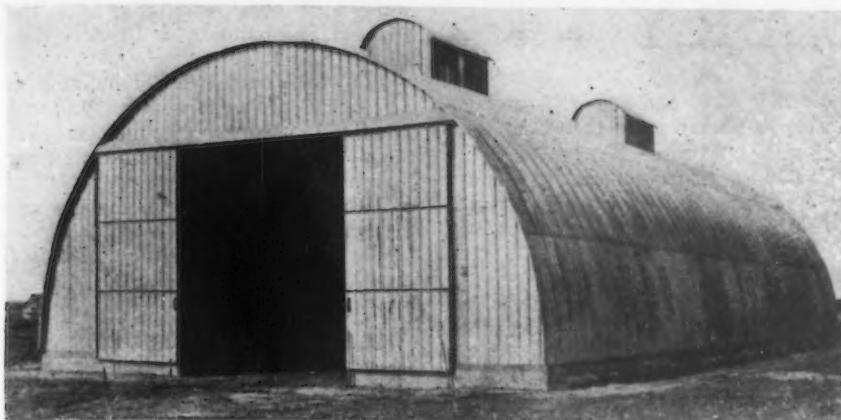
One eccentric runs both tools—shear and bar cutter—in succession. That is, both tools are actuated during the course of one revolution of the eccentric, but not at the same instant. This prevents overloading the machine and yet permits using two separately controlled parts of the machine at the same time.

Shear blades are reversible and provided with four cutting edges. The bar cutter is the same as on other Buffalo shears. Angles can be cut on a miter without inclining the stock.

The three sizes of this shear have capacities for cutting plates through the center ranging from 3/8 to 1 1/4 in. in thickness, with 1/8 in. additional for trimming plates along the edge.



Universal Shear With Blades Reversible and Carrying Four Cutting Edges. The bar cutter has a wide application



New-Type Farm Building of Steel Members

A NEW-TYPE farm building has been introduced recently in the Middle West for storing wheat and agricultural equipment. The building is designed so that it has no exterior posts and is supported by fabricated steel trusses 15 ft. apart. Steel angle purlins run from end to end, 4 ft. apart, on the trusses. The covering is of galvanized sheets.

The illustration shows a building 40 by 90 ft., weighing about 30,000 lb. This building provides large storage space with low expense and

with the greatest strength against wind stresses. In other buildings of a similar design the roof has been flattened out and the side walls made perpendicular for the lower 6 or 8 ft. in height, so that windows may be installed.

This type of building was originated in the wheat belt to serve as a temporary storage for grain and a permanent storage for the large combine reapers and harvesters. It is being fostered by the Columbian Steel Tank Co., Kansas City.

10,500-Kw. Motor-Generator Set for Slabbing Mill

What is believed to be the largest flywheel motor-generator set on record has been ordered by the Illinois Steel Co., Chicago, for use in its new 44-in. reversing universal slabbing mill under construction at Gary, Ind., works. The set, which will be built by the Westinghouse Electric & Mfg. Co., East Pittsburgh, has a continuous rating of 10,500 kw. at 700 volts and will carry peak loads of approximately 40,000 amp.

It consists of three 3500-kw., 700-volt direct-current generators, coupled to a 6500-hp., 25-cycle induction motor, with a 180,000-lb. flywheel 15 ft. in diameter. The overall length is about 60 ft. and the total weight of the set, including the flywheel, will be 600,000 lb.

All three generators will be operated in parallel by means of cross-connected differential and cumulative compound-series fields. The generators will supply power to two 5000-hp. double-armature reversing motors (making up a 10,000-hp. twin drive for the horizontal rolls) and one 2500-hp. single-armature reversing motor for the vertical rolls.

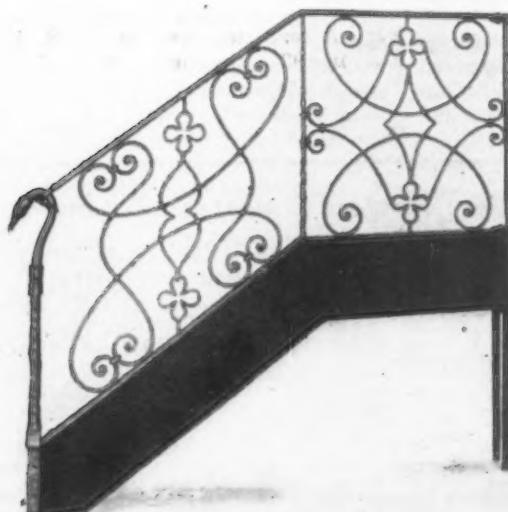
Motor-generator set and motors will be installed in a substation using a closed recirculating ventilation system, which will require 220,000 cu. ft. of air a minute. It will require a cooler, capable of dissipating 1800 kw. The order includes also a 1000-kw. motor-generator set complete with exciter, auxiliary transformers and circuit breakers.

New Light-Weight Channel for Special Uses

A NEW 12-in. light-weight channel, on which regular production was begun in February, is being introduced by the Jones & Laughlin Steel Corporation, Pittsburgh. The flange is 1½ in. wide and the section weighs 10.6 lb. to the linear foot. This product, like the company's 10-in. light-weight channel, permits use of a rolled section said to offer greater strength than formed plate of equal weight,

without the necessity of employing standard channels, of weight and strength in excess of requirements.

In the accompanying illustration the new channel is shown as used on a stair stringer, for which both the 10-in. and 12-in. sizes are particularly adapted. The new channel is furnished in mill lengths of 20, 25, 30 and 40 ft., and in warehouse lengths from 3 to 40 ft.



LIGHT - WEIGHT 12-In. Channel Used on Stair Stringer. The 10-in. size is particularly applicable here, also. Both are said to be stronger than formed plate of equal weight

Further Decline in Steel Corporation Orders

Unfilled orders of the United States Steel Corporation showed a further drop of 91,163 tons in June, reaching 3,968,064 tons, or the lowest figure since the end of last September. It is about 7 per cent below the level one year earlier, but is 9 per cent above that of two years ago.

There has been a gain of 912,442 tons between Aug. 31, 1929, and March 31, 1930. Successive declines since the end of Mar.' have resulted in a total decrease of 602,589 tons, or about 66 per cent of the preceding gain.

Unfilled tonnage at the end of each month for the past two and a half years follows:

	1930	1929	1928
December	4,417,193	3,976,712	
November	4,125,345	3,673,000	
October	4,086,562	3,751,030	
September	3,902,581	3,698,368	
August	3,658,211	3,624,043	
July	4,088,177	3,570,927	
June	3,968,064	4,256,910	3,637,000
May	4,059,227	4,304,167	3,416,822
April	4,354,220	4,427,763	3,872,133
March	4,570,653	4,410,718	4,335,206
February	4,479,748	4,144,341	4,398,189
January	4,468,710	4,109,487	4,275,947

▲ ▲ ▲ OBITUARY ▲ ▲ ▲

THOMAS McDONALD, who was identified with the iron and steel industry of the Middle West for nearly half a century, died at the North Side unit of the Youngstown Hospital, Youngstown, July 12. He was born in 1848 in Allegheny County, Pa., and was educated in the public schools of Allegheny County, later taking a commercial course at the Iron City



Thomas McDonald

Commercial College, Pittsburgh. After practicing the carpenter trade at Braddock for several years, he entered the service of the Carnegie Steel Co. as carpenter in the construction of the Edgar Thomson Works and in 1876 entered the Bessemer department. Four years later he was made turn foreman and in 1884 night superintendent. He left the Carnegie company in 1889 to take charge of the Bessemer department of the Allegheny Bessemer Steel Co., at Duquesne, Pa., where he remained until 1893. In that year he became general superintendent of the Ohio Steel Co., Youngstown. Mr. McDonald returned to the Carnegie company as general superintendent of the Youngstown district on Jan. 1, 1907, and nine years later was made consulting manager of that district. Because of his services to the company, the Carnegie Steel Co. named its plant and model town of McDonald, Trumbull County, Ohio, in his honor. Since his retirement in 1921, he has been consulting engineer for the company at Youngstown.

HENRY DRESES, 76 years old, founder of the Dreses Machine Tool Co., Cincinnati, died last week, while visiting abroad. He received his early technical training in Germany and England and came to the United States in 1880. From this time to 1896, when he founded the Dreses company, he worked for the Ahrens Fox Co., Lodge & Davis Co., and other machine tool concerns. Mr. Dreses

retired in 1923 and has made numerous trips abroad since that time.

WILLIAM A. MONTGOMERY, founder of the North East Electric Co., Rochester, N. Y., died in that city July 10, aged 76 years.

JOHN M. CALLEN, for a number of years vice-president of the Reading Iron Co., and Thomas Iron Co., Reading, Pa., died at the Reading Hospital on July 2, aged 73 years. In his early days, Mr. Callen was identified with the Pottsville Iron & Steel Co., and in 1899 he entered the employ of the Reading Iron Co., and was successively auditor, purchasing agent, assistant general manager and vice-president, having had for some years supervision of purchases, distribution of materials and contractual relations.

JAMES E. HOWARD, engineer-physicist for the Interstate Commerce Commission since 1914, died at his home in North Conway, N. H., on July 6. He was born at Palmer, Mass., in 1851 and was educated at Highland Military Academy, Worcester, Mass. Early in his career he was in the employ of the city of Boston as civil engineer and later with the Great Northern Railway in location and construction work. In 1874 he went to Chicopee, Mass., as mechanical engineer in the construction of testing machinery for the Watertown arsenal. Six years later he became engineer of tests at the arsenal, and left this post in 1910 and for four years was engineer-physicist of the Bureau of Standards.

Ship Contracts Placed

WASHINGTON, July 15.—The Shipping Board has authorized loans to the Baltimore Mail Steamship Co. in amounts aggregating \$6,540,000 to be used in the reconstruction of five steel cargo steamers. The hull lines will be modified and modern machinery and equipment will be installed. The ships will be operated between Baltimore and Hamburg under the terms of an ocean mail contract awarded the Roosevelt Steamship Co. Contracts covering the reconstruction

work have been negotiated with the Federal Shipbuilding & Drydock Co., Kearny, N. J.

The Newport News Shipbuilding & Drydock Co., Newport News, Va., will build two 6300-ton combination passenger cargo steamers for the Eastern Steamship Lines. Their construction will cost \$3,214,500 each. Loans aggregating \$4,661,220 have been made by the Shipping Board in aid of building the vessels.

More Ships Being Built in United States

Steel shipbuilding under way on June 30 is reported by Lloyd's Register of Shipping at 3,057,735 tons, gross register. This shows a decline of 6.4 per cent from the 3,265,929 tons under construction March 31.

The United States registers a gain, from 222,974 tons to 238,163 tons. Great Britain and Ireland absorb the loss, dropping from 1,614,993 tons to 1,392,063 tons. Other countries, as a group, remain practically stationary—1,427,509 tons June 30, against 1,427,962 tons March 31.

Present construction under way in the United States is double that of a year ago, at 119,098 tons. British yards are 4 per cent less busy than then, and other maritime powers have advanced 13 per cent during the year.

Workmen Safer Working in Large Plants

Results of a three-month safety contest conducted in New York, in which 1485 companies participated throughout, show that the larger organizations are safer employers than the smaller ones. Nearly 1200 of the units had 100 employees or less; 287 had more than 100. The frequency rate per million man-hours worked out at 18.08 for the larger plants; 22.36 for the smaller; 19.27 for all.

Of the total, 986 companies went through the period without a lost-time accident, 75 being in the "large" group. The remaining 499 companies reported a total of 1464 such accidents—991 for the 212 large companies having accidents and 473 for the 287 small companies having accidents. One group of 669 companies, with 250 accidents in the first four weeks, suffered only 131 in the second four weeks.

Materials for Construction: Portland Cement and Trackwork

	June, 1930	May, 1930	June, 1929
Portland cement (a), thousands of bbl.:			
Produced	17,237	17,249	16,803
do. six months	75,892	75,076	
Shipped	18,780	17,224	18,949
do. six months	70,139	70,248	70,248
Stocks, end of month	29,348	30,891(b)	27,505
Trackwork for T-rail track of 60 lb. and heavier (c):			
Shipments, net tons	10,553(d)	12,799	14,839
do. six months	74,310(e)	85,439

(a) United States Bureau of Mines.

(b) Largest on record.

(c) American Iron and Steel Institute.

(d) Smallest since November, 1928.

(e) Smallest first-half since these reports were started, in 1923.

▲ ▲ ▲ PERSONALS ▲ ▲ ▲

JOHN E. GARRITY, general sales manager of the West Leechburg Steel Co., Pittsburgh, has resigned because of ill health and will spend the next six months in rest and travel. He has spent the greater part of his business life with the West Leechburg company, having become identified with it 20 years ago. He has been general sales manager for the last 15 years. **M. F. FINDLEY**, district manager at Detroit for the West Leechburg company, succeeds Mr. Garrity as general sales manager, the appointment being effective immediately. Mr. Findley also has a long record of service with the company, having become identified with it 23 years ago. After a period of service at the mill and home office, he was stationed for a short time at Detroit and later served as Chicago district manager for nine years. He had held his recent position at Detroit for five years.

GEORGE H. AUPPERL, a specialist in the manufacture of chilled rolls, will return to Pittsburgh about Oct. 1 from Japan, where he has been for the past two years. He expects to land in London Sept. 1, and will spend a few weeks inspecting some of the principal roll foundries in Europe.

A. M. MADDOCK, **H. F. BEGLE**, **F. A. KALES**, **R. L. OTTKE** and **C. B. NASH** have been elected vice-presidents of the Standard Sanitary Mfg. Co., Pittsburgh, a division of the American Radiator & Standard Sanitary Corporation. Mr. Maddock is sales manager, Eastern division, with headquarters in New York; Mr. Beglen, sales manager, Central division, with headquarters in Chicago; Mr. Kales, sales manager of Western division; Mr. Ottke, sales manager, brass division, and Mr. Nash, director of publicity.

WILLIAM H. MILLER, New England sales manager for the Pratt & Whitney Co., Hartford, Conn., last week was presented with a wrist watch by associates as a token of his completion of 40 years with the company.

STUART R. IVES, formerly vice-president and general manager, Lyle Culvert & Pipe Co., Minneapolis, as announced in THE IRON AGE of June 12, has been appointed general manager of the Armcoc Culvert Manufacturers' Association, with headquarters in Middletown, Ohio. Previous to his joining the staff of the Lyle Culvert company early in 1929, Mr. Ives was connected with the American Rolling Mill Co. for 13 years, of which

10 years were spent in the culvert and flume department and seven years as manager of that department.

JAMES R. WHITE has been made vice-president and director of sales



James R. White

of Jenkins Brothers, manufacturers of valves, New York.

JOHN A. C. WARNER, who has been research engineer with the Studebaker Corporation since 1926, has been appointed secretary and general manager of the Society of Automotive Engineers, succeeding the late Coker F. Clarkson. Mr. Warner was graduated from the Worcester Polytechnic Institute in 1917. As an engineering officer in the air service technical section, he did duty in connection with the inspection and testing of aircraft and aircraft engines for the United States Army. In 1923 he became research engineer of the Society of Automotive Engineers. C. B. VEAL, since 1926 research manager of the society, has been made assistant general manager, a newly-created office.

FRANK GROSSMAN has been appointed special representative, with headquarters at 812 Peoples Gas Building, Chicago, for the Glamorgan Pipe & Foundry Co., Lynchburg, Va.

CHARLES H. FLICKINGER has resigned his position as chemist with the Corrigan, McKinney Steel Co., Cleveland, to become chief chemist of the Great Lakes Steel Corporation, Detroit. **L. SELMI**, since 1915 metallurgical engineer with the Corrigan, McKinney company, has accepted a similar position with the Great Lakes corporation.

ARTHUR SCHROEDER has become special representative of the Higgins-Bothwell Co., sales representative in Michigan for the Universal Steel Co., Bridgeville, Pa., and he will have charge of sales in Michigan of alloy, heat-resisting and rustless steels.

FRITZ W. MEYER, heretofore chief metallurgist of the National Radiator Co., has resigned that position, but will remain as that company's foundry consultant. He will have quarters at 231 South LaSalle Street, Chicago, and at 703 Park Avenue, Beloit, Wis.

JOHN J. SOMES has been made manager of the Chicago office, 20 North Wacker Drive Building, Chicago, of the Terry Steam Turbine Co., Hartford, Conn.

H. D. CARLTON has resigned as president of the Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn., and as vice-president of Manning, Maxwell & Moore, Inc., New York.

RICHARD FERGUSON, president and treasurer of the Ferguson Gear Co., Gastonia, N. C., has been elected a director of the Gaston Loan & Trust Co.

C. H. ARMSTRONG, at one time director of trade extension of the Textile Bag Manufacturers Association, has been appointed general manager of the Clegg Lock Washer Co., Chicago. He will have complete charge of production, marketing and administration.

A. V. DEFOREST, formerly research engineer for the American Chain Co., has been appointed consulting engineer for the company. He will be associated also with the newly organized Welding Engineering & Research Co., New York.

HUGH GEOFFREY HERRINGTON has been made general manager of the testing laboratory known as High Duty Alloys, Ltd., Slough, England.

Comparative real wages, based on 100 for Great Britain, are given by *Economist*, London, as 197 for United States, 165 for Canada, 148 for Australia, 97 for Ireland, 87 for Netherlands, 77 for Germany, 58 for France, 52 for Austria, 45 for Spain and 43 for Italy. Similar figures for Denmark and Sweden show about 112, with 65 for Poland, 74 for Czechoslovakia and 45 for Estonia.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

ESTABLISHED 1855

Risking for Better Business

ON his visit to the United States last year Ramsay MacDonald said many things which captured the hearts of his hearers. In one of his most telling utterances, after saying that for generations the leading naval powers had risked their all on the chance of a future war, he quickly asked whether the time had not at last come when they should be willing to risk something in behalf of peace.

That striking question of the British premier suggests one like it that applies directly to the present stage of the business situation in the United States:

Has not the time come for men in industry to take some risk in behalf of better business?

Bringing the interrogation home to the constituency of THE IRON AGE, is it not time manufacturers in the metal-working industry thought more, talked more and did more on the constructive side of the present situation? There need be no blinking the fact that sentiment in that industrial group has been pessimistic. Somehow it occurred at one and the same time to many men in the metal trades that President Hoover's conference movement had not brought to pass all that he and others hoped for, and hence that there was nothing for individuals and individual companies to do but limit their activities, conserve their resources and wait for a new impulse from without.

General Manager DuBrul of the National Machine Tool Builders' Association, in his July review of conditions affecting his industry, rightly characterizes the timidity which many executives have shown since the Washington conferences of December and their admirable plans for increasing employment have drifted into the background. Not a few metal-working companies took advantage of the first lull following the stock market panic to cure defects in layout and methods and to install machinery of the highest efficiency. Yet there are still many cases in which replacement might well be undertaken—and paid for out of surplus, if not from the cheapest loans in years—but financial executives do not share the faith and foresight of production managers.

Mr. DuBrul does not hesitate to say that divers machine tool builders themselves might do what they are urging others to do—borrow some of this low-priced money and improve their plants to be able to meet the demands of their customers, and also to lower their own production cost to the point of making money out of the volume they are now getting. In that connection we suggest an activity in which the National Machine Tool Builders' Association and all other manufacturers' organizations in the metal trades

might well engage: Let them collect and transmit to their members the facts concerning machinery replacements lately made, or in the making, among their membership. Such information, distributed without the use of names, would be an effective form of propaganda, creating a contagion of activity in place of a contagion of inaction and hesitancy.

In its long experience of business ups and downs, THE IRON AGE has not hesitated to express its opinions of the various "sunshine" movements that have come in all periods of depression. False starts have been followed by fresh reaction, while prosperity by proclamation has produced little more than a psychologic effect and that of short duration. What we have suggested above is in effect that more men of the metal-working industry—the greatest of all our industrial groups—take home the gospel some of them helped to promulgate at Washington last December. A year of sub-normal business has gone by. The time has come when many concerns should be shaping their plans for a larger and more economical operation in the next forward movement. In the steel industry improvement programs announced since November have shown a faith in the country's future quite measuring up to Andrew Carnegie's well remembered policy of replacement at the low costs of times of depression, to be ready for the greater demand of good times. Men of the great metal-working industry may well take that leaf from the steel maker's book.

What Are Wages?

IN computing unemployment of labor it is not the number of persons that is so important as the number of hours unworked. There are many who are now rated as employed but are working only one-half or one-third time. This is not entirely a consequence of the present depression, but in some industries it is habitual. Thus, in anthracite coal mining, the 160,000 personnel of that industry in 1928 averaged only 217 days.

At the recent conference between operators and miners the former suggested the advantage of a reduction of \$2 per ton in the price of coal, involving a reduction of the wage scale, not as a demand, but as a desirable policy, having in view the sale of more coal. The miners politely but firmly refused to entertain any such idea.

This aptly illustrates the great blight on those industries where organized labor has a strangle-hold. Part-time work at a high rate of wage is preferred to full-time work with larger annual earning, even if the market crumbles away.

The building industry in the metropolitan areas is in a similar situation.

In such willful enjoyment of the luxury of leisure organized labor becomes parasitic.

Mr. Coolidge, in one of his recent essays, remarks that "we are now in a decline of prices, but not of wages." There are others who express the hope that wages will not have to be reduced. The leaders of organized labor go further and say they will not allow them to be reduced.

But what is meant? Is it the wage rate per hour or per day? Is it the wage earning per annum? Is it the real wage, i. e., the goods for which labor may be exchanged? If these answers be all in the affirmative they are contradictory. The maintenance of a nominal wage rate per hour means an increase in real wage if an hour's work becomes able to acquire more goods, but it means a decrease if it curtails the hours of work per annum.

Is Trade Momentum Being Lost?

WHEN the stock market collapsed, a very prevalent view was that something was needed to tide over, that there was a shock and a cushion would be very helpful. President Hoover's construction program was based upon that conception. About eight months have elapsed since those views were formed. While they were not definite as to time, it is now a common impression that an ample amount of time has elapsed for the particular performance considered. More than that, the evident failure of business to be now clearly and definitely on the way to improvement, allowing of course for the season, raises a further question.

It is not a case of something fresh having gone wrong, but of influences being at work that were not being seriously and carefully considered, if they were considered at all, eight months ago. It is well to take a look at the matter from the angle that following the stock market collapse the whole thing was not a case of shock. After all, trade had considerable momentum that could not be sharply stopped, however much in the course of time it could wane.

The probable extent of the shock itself may have been overestimated, and it is helpful to revert to what occurred after the ending of the World War. That shock was vastly greater. One could not suggest "business as usual" for the usual had been completely lost, buried, destroyed, and even the opportunity was lacking, for values were unknown. Certainly the vastly preponderating opinion was that prices would go away down whereas they went up instead. It is true recovery did take time, but considering the magnitude of the two shocks we ought to be doing much better now than we are.

From this viewpoint of momentum a few things can be seen. The railroads laid before the President a certain program of expenditures for 1930. In the first quarter of the year they exceeded the promise. Now they are not doing so well and nobody is disposed to blame them. They had large earnings last year while lately their earnings have been poor. Is it not a case of loss of momentum in railroad expenditures?

Figures compiled at Washington late in June

showed that expenditures for public works in the first half of this year amounted to about \$1,700,000,000, exceeding by at least \$200,000,000 the first half of last year. The work this year was financed by taxes and bond issues based upon the previous state of trade, not the recent state. If business in its present state can stand such public expenditures, why were not the expenditures larger last year and the year before, when business was in much better shape? Surely one cannot deny that the expenditures of the last six months contained a large element of momentum and there is nothing visible today calculated to supply fresh momentum for the future.

In the fabricated structural department of the last ten issues of THE IRON AGE actual lettings reported totaled 322,000 tons, or an average of 32,200 tons a week, while new projects coming out totaled 421,000 tons, the lettings averaging 23 per cent less than the projects. In the same period two years previous lettings were about the same, 325,300 tons, but the projects only 257,650 tons, lettings exceeding projects by 26 per cent, which is natural enough, as many small jobs do not appear as projects, only as actual lettings. Evidently there is no dearth of desire to do things, but when it comes to the scratch the projectors seem to fear the prospects.

Dividends on Steel Common Stock

STEEL company earnings applicable to dividends on the common shares have been approaching the vanishing point, speaking generally. In some cases they have already vanished. In the case of the Steel Corporation, with its large reduction last year in fixed charges and an increase in the number of common shares, it is a matter of reduction rather than elimination. A separate question is that of payment of dividends, for that can be done out of surplus, and usually is so done if the directors think prospects are sufficiently promising.

Steel company earnings in the first quarter of this year represented a large decrease. The Steel Corporation, for instance, had the smallest since the second quarter of 1928. From first to second quarter there was a decrease of about 5 per cent in steel ingot production and steel prices averaged about \$2 a ton lower in the second quarter, according to the composite of THE IRON AGE. Second quarter earnings are therefore likely to show quite a decrease and present circumstances point clearly to the third quarter showing another and perhaps even greater decrease.

In recent years the only very bad quarter in steel was the fourth quarter of 1927. In that quarter the Steel Corporation earned only three-fifths of its common dividend, on five-eighths as many shares as are now outstanding, but after paying fixed charges no longer required, as more than \$30,000,000 of annual charges were eliminated by last year's financing.

It is interesting therefore to review conditions existing in the fourth quarter of 1927. Steel ingot production was at about 67 per cent of capacity existing at the beginning of that year, and shipments, by the Steel Corporation and independents, may be taken at 68 per cent. In the quarter just ended steel production was one-fifth larger in tonnage than in the fourth quarter of 1927, but operation in terms of capacity

was only one-tenth larger, by reason of increase in capacity.

For the present quarter, an average operation of 61 per cent would make the same tonnage as was produced in the fourth quarter of 1927, when there was a 67 per cent producing rate. The balance of chances seems to be that the output will lie between these limits.

From these and other considerations it would seem altogether likely that not a few steel companies will fail this quarter to earn anything on their common shares. Cases are widely divergent, both by reason of varying financial set-ups and by reason of differences in the character of product, for it is clear that some finished steel products are much less profitable than others at present, yet they show scarcely any more market stability.

Assuming for convenience that there is the same tonnage as three years ago, there is a lower operating rate because capacity is greater. What difference does that make? In some cases there are greater fixed charges, which is simply bad. In other cases enlargement has been financed by earnings, but running expenses may thereby be increased, raising unit cost with the same tonnage output.

We may also compare prices now and in the fourth quarter of 1927. For that quarter THE IRON AGE composite of finished steel averaged 2.309 cents a pound, while last week it stood at 2.185 cents, or \$2.50 a net ton lower. Costs have scarcely been reduced by that amount.

More Smoke About the Naval Treaty

To the Editor: The editorial discussion in the July 10 issue of THE IRON AGE on the London Treaty for the further limitation of naval armaments is evidently inspired by the unanimity of thought among the British, the Japanese and the American admirals that the treaty renders their own respective countries practically impotent in naval warfare.

The editor evidently has not fully considered the value of the "smoke screen" in war or in preparation for war. How does he know that some of the admirals are not spreading a thick screen of that kind? The editor adds, "What really puzzles us is why some politicians should be so much concerned by this treaty, which most people are willing to leave to a patriotic administration."

Does the editor recall that when General Dawes arrived as new American Ambassador in London he was reported as having made the statement, "The next Naval Conference will be conducted by statesmen. If they need any advice from admirals or captains, they will send for them and get it." Does the editor further recall Arthur Brisbane's comment on that idea? After quoting the new ambassador's remarks the comment was: "That sounds like a good platform. We know we have the admirals and the captains, but where are we to get the statesmen?"

Will Rogers expressed the same thought when he wrote, apropos of the results of the Naval Conference in London, "We never lost a war and never won a conference."

WILLIAM MCENTEE,

Captain, Construction Corps, U. S. N.

Munhall, Pa.

Would Modify Trade Practice Rules

Association Executives to Consider Proposed Curtailment of Codes by Federal Trade Commission

WASHINGTON, July 15.—All industries which have held trade practice conferences with the Federal Trade Commission have been asked to be represented at the annual convention of the American Trade Association Executives to be held in September. The meeting is considered to be exceptionally important because it will discuss new trade practice rules which the commission is preparing to draft in view of its changed policy concerning the conferences.

The standing committee of industries that have held trade practice conferences with the commission has asked the latter to postpone promulgation of its new rules until after the meeting of the trade association executives. It is understood that the request has been or will be granted.

The request was made because it is desired by the interested industries to discuss the new rules with the commission before they are officially announced and thus bring about co-operation that otherwise might be lacking. The new rules manifestly will affect not only the codes of the future but will be retroactive and call for revision of those already adopted.

Would Curtail Group II Rules

In substance, the commission has greatly curtailed the breadth of the so-called Group II rules. These are

rules which are accepted by the commission as "expressions of the trade." They may or may not be legal. The commission does not pass on their legality or illegality. They are thus distinguished from the other set of rules, under Group I, which calls for the elimination of trade practices that the commission considers to be plainly illegal.

It is Group II rules that are of greatest value to the industries. For the rules provide for elimination of trade practices which are considered to be unethical, and economically unsound, yet the rules might be illegal.

It is apparent that the reason for the change in the policy of the commission was due to growing complaints that there has been infrequent misuse of Group II rules. It was especially complained that resort had been made to this set of rules to fix prices. The Department of Justice has reported a number of such cases. It is believed that the department informed the commission that the Group II rules as previously in effect were proving embarrassing and intimated that their modification would be desirable. The result has been that the commission is surrounding Group II rules with provisions of the Clayton Act.

As a means of staving off protest, the commission has yielded to a re-

quest that hereafter it submit rules before being promulgated to the interested industries. The latter are thus given an opportunity to accept or reject the rules, suggest modification, or propose further conference.

Pittsburgh Cites Costs of Short-Haul Rates

The Pittsburgh district subsidiaries of the United States Steel Corporation and the Jones & Laughlin Steel Corporation, Pittsburgh, will have their yearly freight charges increased by \$1,156,274 by the increased short-haul freight rates on iron and steel products, which became effective May 20, according to testimony presented before the Pennsylvania Public Service Commission in Pittsburgh last week. According to F. A. Ogden, general freight agent for the Jones & Laughlin company, the new rates will add \$251,176 to that concern's freight charges, while W. S. Guy, traffic manager for the Carnegie Steel Co., stated that Steel Corporation subsidiaries in the Pittsburgh district will have to pay \$905,098 additional.

The possibility of shipping by water instead of rail was emphatically expressed at the hearing by Mr. Ogden, while John A. Coakley, general traffic manager for the American Steel & Wire Co., Cleveland, mentioned the possibility of deciding against further expansion at that company's Donora, Pa., works because of freight rate disadvantage.

Several other consuming companies

The Week in Business

Drift of Current Financial
and Economic Opinion

SO far this year business comparisons have been made rather commonly against the first half of 1929, "when prosperity was advancing to boom proportions," says Col. Leonard P. Ayres, Cleveland Trust Co. "In the second half of this year such comparisons will make better showings. In that portion of 1929 business activity was rapidly shrinking, and in the last part of 1930 it is likely to be gradually advancing. From this time forward the sentiment of business should improve."

Favorable symptoms are emphasized again by *Business Week*: "The characteristic signs of the process of business recovery appear more clearly this week. . . . General trade . . . has risen to relatively high levels. . . . We expect some backsliding in coming weeks, but continue confident that the general trend is upward and the underlying conditions favorable for early recovery."

Somewhat further midsummer recession is seen by *Annalist* as the general status of business during the past week. "A significant fact with regard to it," says Benjamin Baker, "is the rapid

spread of public recognition of what actual conditions are."

Another commentator mentions the same "public recognition" when *Commerce and Finance* says: "The most important feature of the business aspect is the sentimental change which has taken place in the last few months. Six months ago everyone was bullish. . . . Now the reverse is the case." Yet the view that "America has committed commercial and financial suicide" is impossible "for the man who has lived long enough to realize the irrepressible resiliency of this wonderful country, and the promptitude with which we recover from attacks of depression similar to the one from which we now suffer."

Prices and Activity Not Wedded

Showing how both wholesale and retail prices were trending steadily downward from 1925 until mid-1927, with general business prosperous during nearly all that period, and production increasing, Colonel Ayres points out that "there is no such close relationship between business prosperity and price movements as current

comment would suggest." He concludes that "we are warranted in believing that definite improvement in business will become evident during the months directly ahead."

Are Wages to Come Down?

Meantime the question of deflation of labor has become more acute. Wage and salary cuts are reported from automobile plants and from makers of silk hosiery. Answering its own question, "Will wages come down in proportion to the fall in stocks and commodities?" *Commercial and Financial Chronicle* says:

"Eventually, yes; but not soon. The total bulk of wages earned is now coming down through unemployment. When this lack of men at work becomes acute, wages must come down per man. No union card can feed an idle man."

That journal finds no observable change in the trade and industrial situation. It holds the "most troublesome and most disturbing feature, charged with unknown possibilities of harm," to be the failure of agriculture to respond to Government efforts at price maintenance.

also had representatives at the hearing, who cited the added burden to them which the higher short-haul rates have made. Among them were A. J. Bessolo, traffic manager for the Standard Steel Car Corporation, Butler, Pa., and M. D. Perry, representing the Pittsburgh Screw & Bolt Corporation, who stated that the higher rates would increase his company's yearly freight bills from \$29,749 to \$38,152. Other companies represented were the United Engineering & Foundry Co., the Pressed Steel Car Co., Russell, Burdsall & Ward Bolt & Nut Co., and Pittsburgh Bridge & Iron Works.

George Lowe, assistant traffic manager of the Illinois Steel Co., Chicago, stated that, while Pittsburgh mills pay 8c. to 9½c. per 100 lb. for hauls of 20 to 40 miles, shippers in the Chicago district pay only 2½c. to 3c. for hauls of 29 to 60 miles.

It was also brought out in the testimony that steel production in Allegheny County has remained practically stationary for fifteen years, while it has doubled or tripled in competing districts. It was pointed out that steel ingot production in the county amounted to 7,949,031 tons in 1928 as compared with 7,669,221 tons

in 1913. In the same years joint production in Indiana and Illinois increased from 5,000,000 tons to 11,600,000 tons, while in Ohio production rose from 6,700,000 tons to 12,973,000 tons.

In spite of a plea made by the railroads to obtain a 60-day adjournment of the hearing, it will be resumed again in a short time at an unannounced date, quite likely at Harrisburg.

Otis Expansion Includes Wide Continuous Mill

Carrying out its expansion program announced last December, the Otis Steel Co., Cleveland, shortly will award contracts for a continuous rolling mill for the manufacture of sheets, strip steel and light plates under the process controlled by the American Rolling Mill Co. The mill will roll material up to 63 in. wide or wider than is now commonly being rolled by continuous mills.

Located in conjunction with the blooming mill at the company's River-side plant, the mill will roll finished plates and strip and unfinished sheets

direct from the steel ingot. It is stated that with the new equipment the company will be able to concentrate practically all of its production of sheet bars, plates and slabs for strips on one mill. It will be equipped to produce 36,000 tons of material monthly with an ultimate capacity of 50,000 tons. The expansion program calls for extension to the present blooming mill buildings and installation of three additional heating furnaces and of six stands of mills. The extensions, it is stated, will involve an expenditure of approximately \$5,000,000.

The directors of the Otis company have also authorized a survey looking to the production of alloy steel. It contemplates entering the alloy steel field under certain European patented processes.

Excavations and concrete foundations for roughing and pickling buildings at the Michigan Steel Corporation, Ecorse, Mich., have been completed and work on the super-structures of the buildings is expected to be finished by early fall.

Iron and Steel Markets

Business Upturn Awaited

Two-Week Industrial Holidays Limited Mainly to
July—Structural Awards Large—Forward
Buying of Pig Iron at Chicago

INDUSTRIAL activity, influenced both by business depression and by seasonal reaction, is at a low ebb, but the iron and steel trade, always highly sensitive to change, sees signs of recovery. Automobile makers, as well as other important manufacturers, have shut down for a fortnight or more. Yet most of these suspensions are taking place this month, and resumptions in August will of necessity result in renewed requirements in materials.

Even now the mills are commencing to feel the effect of this rebound in demand. The Ford Motor Co., which has shut down until July 28, has placed orders for a considerable tonnage of sheets, enabling certain producers to increase operations. The Ford schedule for the first ten days of August is 6500 cars daily, compared with a recent output of 8300 cars.

Other straws pointing to improvement in business are found in the scrap and pig iron markets. While there continue to be scattered declines in old material prices, with heavy melting grade down 25c. a ton at Cleveland, the situation as a whole shows that lack of definite trend which frequently precedes a turn. It is possibly significant that a purchase of 30,000 tons of heavy melting grade at Pittsburgh failed to bring out a further break in prices and that scrap brokers, notably in the Chicago district, are beginning to accumulate material in anticipation of a higher market.

Activity in pig iron centers in Chicago where sales are the largest in three months. Evidently convinced that prices are scraping bottom, Western tonnage buyers have covered their requirements for the third quarter and in some instances for the entire last half. Demand remains light in other markets, particularly where price readjustment is still under way. Eastern Pennsylvania foundry iron is off 50c. a ton at Philadelphia and the Alabama product has declined an equal amount for delivery in the St. Louis and Cincinnati districts.

The transitional character of business is reflected in steel plant operations. Slight increases by some producers have been offset by further curtailment by others and steel ingot production at large continues to average 56 per cent of capacity.

Construction work stands out as the chief sustaining influence during the July suspensions among manufacturing users of iron and steel. The building of great pipe line systems for natural gas, oil and gaso-

line is a major transportation development reminiscent of the period when our railroad network was being created. Plants making line pipe are fully committed for three to four months, and, although they are reluctant to take further business at present market levels and buyers, in turn, hesitate to place tonnage that might not be available this year, large projects continue to be planned. The latest to be announced, a 1400-mile gasoline line from Oklahoma to Des Moines, Omaha, Chicago and Minneapolis, will require 75,000 tons of steel.

Structural steel awards, at 58,000 tons, are the largest for any week this year. Included in the total are 14,800 tons for a New York subway section, 9500 tons of tank work for the Gulf Refining Co. and 7500 tons for a bridge at Seattle. Demand for reinforcing bars is holding up fairly well, with mill shipments continuing at the high level of June. The low rate of residential construction is reflected in slack demand for merchant pipe, but a "home modernization" campaign by a leading maker of heating equipment has brought results surpassing expectations.

Shipbuilders, who continue very active, are figuring on an airplane carrier for the Navy, requiring 10,000 tons of plates, shapes and bars.

Finished steel prices are still under pressure, but show the most irregularity in the light rolled products. The price of 2.45c. a lb., Pittsburgh, on black sheets, which has been in evidence for several weeks, has become more general and is now being openly quoted by at least one mill. Automobile body sheets are subject to shading and blue annealed sheets are weaker in some centers. On new business in tin plate price preferentials are being extended to smaller consumers.

The European steel market is demoralized, following the Continental cartel's abandonment of fixed prices except on semi-finished steel, wire rods and beams.

Prices of non-ferrous metals have given further ground. Tin, at 29.12½c., is close to the bottom figure of 28.75c. a lb. reached in 1922. Zinc, in striking 4.05c. late last week on sales to preferred buyers, reached the lowest level since 1907.

Both of THE IRON AGE composite prices have receded to new lows for the year. Pig iron is off 16c. to \$17.09 a gross ton, the lowest figure since August, 1928; finished steel has declined from 2.185c. to 2.171c. a lb., its lowest since July, 1922.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	July 15, 1930	July 8, 1930	June 17, 1930	July 16, 1929
No. 2 fdy., Philadelphia.....	\$19.76	\$19.76	\$19.76	\$21.76
No. 2, Valley furnace.....	18.00	18.00	18.50	18.50
No. 2 Southern, Clnti.....	16.69	16.69	16.69	17.69
No. 2, Birmingham.....	14.00	14.00	14.00	14.50
No. 2 foundry, Chicago*.....	18.00	18.00	18.50	20.00
Basic, del'd eastern Pa.....	18.75	18.75	18.75	20.25
Basic, Valley furnace.....	18.00	18.00	18.50	18.50
Valley Bessemer, del'd P'gh.....	20.26	20.26	20.76	20.76
Malleable, Chicago*.....	18.00	18.00	18.50	20.00
Malleable, Valley.....	18.50	18.50	19.00	19.00
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace.....	94.00	94.00	94.00	105.00

Rails, Billets, etc., Per Gross Ton:

Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh.....	31.00	31.00	31.00	35.00
Sheet bars, Pittsburgh.....	31.00	31.00	31.00	35.00
Slabs, Pittsburgh.....	31.00	31.00	31.00	35.00
Forging billets, Pittsburgh.....	36.00	36.00	36.00	40.00
Wire rods, Pittsburgh.....	36.00	36.00	36.00	42.00
Cents	Cents	Cents	Cents	
Skelp, grvd. steel, P'gh, lb....	1.70	1.70	1.70	1.85

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.65	1.65	1.75	1.95
Bars, Chicago.....	1.75	1.75	1.85	2.05
Bars, Cleveland.....	1.75	1.75	1.75	1.95
Bars, New York.....	1.98	1.98	2.08	2.29
Tank plates, Pittsburgh.....	1.65	1.65	1.70	1.95
Tank plates, Chicago.....	1.75	1.75	1.80	2.05
Tank plates, New York.....	1.93	1.93	1.93	2.22 1/2
Structural shapes, Pittsburgh	1.65	1.65	1.70	1.95
Structural shapes, Chicago...	1.75	1.75	1.80	2.05
Structural shapes, New York	1.90 1/2	1.90 1/2	1.90 1/2	2.19 1/2
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.30
Hot-rolled strips, Pittsburgh..	1.65	1.65	1.70	1.90
Cold-rolled strips, Pittsburgh.	2.45	2.45	2.45	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh...	2.45	2.55	2.55	2.85
Sheets, black, No. 24, Chicago dist. mill.....		2.65	2.65	3.05
Sheets, galv., No. 24, P'gh...	3.15	3.15	3.20	3.60
Sheets, galv., No. 24, Chicago dist. mill.....		3.25	3.25	3.80
Sheets, blue, No. 13, P'gh...	2.15	2.15	2.15	2.35
Sheets, blue, No. 13, Chicago dist. mill.....		2.25	2.25	2.45
Wire nails, Pittsburgh.....	2.05	2.05	2.15	2.65
Wire nails, Chicago dist. mill.....	2.15	2.15	2.20	2.70
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.50
Plain wire, Chicago dist. mill.....	2.35	2.35	2.35	2.55
Barbed wire, galv., P'gh dist. mill.....	2.80	2.80	2.80	3.30
Barbed wire, galv., Chicago dist. mill.....	2.85	2.85	2.85	3.35
Tin plate, 100-lb. box, P'gh...	\$5.25	\$5.25	\$5.25	\$5.35

Old Material, Per Gross Ton:

Heavy melting steel, P'gh.....	\$14.75	\$14.75	\$15.00	\$18.50
Heavy melting steel, Phila.....	12.50	12.50	12.50	16.50
Heavy melting steel, Ch'go.....	12.00	12.00	12.00	14.75
Carwheels, Chicago.....	13.50	13.50	13.50	14.00
Carwheels, Philadelphia.....	14.50	14.50	14.50	16.50
No. 1 cast, Pittsburgh.....	13.50	13.50	14.25	15.50
No. 1 cast, Philadelphia.....	13.00	13.00	13.00	16.50
No. 1 cast, Ch'go (net ton).....	12.00	12.00	12.50	14.50
No. 1 RR. wrot., Phila.....	15.00	15.00	15.00	16.00
No. 1 RR. wrot., Ch'go (net).....	10.00	10.00	10.00	13.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt.....	\$2.50	\$2.50	\$2.50	\$2.75
Foundry coke, prompt.....	3.50	3.50	3.50	3.75

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	11.62 1/2	12.12 1/2	12.12 1/2	18.12 1/2
Electrolytic copper, refinery.....	11.25	11.25	11.50	17.75
Tin (Straits), New York.....	29.50	29.75	29.50	47.25
Zinc, East St. Louis.....	4.12 1/2	4.10	4.45	6.70
Zinc, New York.....	4.47 1/2	4.45	4.80	7.05
Lead, St. Louis.....	5.15	5.15	5.30	6.55
Lead, New York.....	5.25	5.25	5.40	6.75
Antimony (Asiatic), N. Y....	6.85	7.00	7.10	8.25

PITTSBURGH, July 15.—Preliminary tonnage releases for early August shipment are reinforcing the belief of many Pittsburgh steel companies that a turning point in business is at hand. In the meantime, suspensions of operation in many large steel consuming plants, as well as in a number of rolling mills, has forced steel production to the lowest point of the year, where it seems likely to remain until the end of the month.

Independent open-hearth furnaces in Pittsburgh and nearby districts are averaging less than 50 per cent of capacity, but the general average is being held at about 60 per cent, because the Pittsburgh district plants of the Steel Corporation are engaged at 65 to 70 per cent, and the leading independent is running at about 65. One large plant, which has had all its furnaces out for the last two weeks for the installation of new blooming mill equipment, will get under way next week, and in the Youngstown district the larger interests are expanding their production to meet pipe mill requirements.

Finishing mill schedules are, of course, light, but the heavy tonnage products, such as pipe, structural shapes and reinforcing bars, are mov-

ing at a fair rate and are doing a great deal to offset the light demand for flat rolled products.

Sheet mills are less than 50 per cent engaged, and strip production has dropped even lower. Bar mills are maintaining their light schedules with the cold-finishing industry depressed and demand for alloy materials from the automobile industry lacking. Railroad car builders in this district are approaching the end of their orders, and the railroads as a whole are buying very little material.

Coincident with the suspension of operations by the Ford Motor Co., many of the large parts and accessories makers who serve it are closed down until July 28. Preliminary specifications indicate that this com-

pany, as well as others in the Michigan district, will resume production at a fair rate after that date. On that assumption August should prove to be a month of gradually expanding steel demand, with output reaching a fair level before the end of the quarter.

Steel prices are still subject to rather extreme shading in individual cases, although the market on small lot purchases, which continue to predominate on order books, is fairly stable. Black sheets have declined \$2 a ton to 2.45c., Pittsburgh, because of the apparent willingness of some of the larger independent makers to meet this price. A report that one Valley maker is openly quoting the 2.45c. price cannot be verified. On galvanized sheets large jobbers have had little difficulty in securing a 3.10c. price, thus indicating that the custom of granting this class of buyers a \$2 preferential has not entirely disappeared. The general market remains at 3.15c. to 3.20c., Pittsburgh. Light plates and blue annealed sheets are

unchanged at recent levels, although concessions have been made by jobbing mills on some occasions to meet the competition of continuous mills. On bars, plates and shapes the market has continued to settle to 1.65c., Pittsburgh, with sharp irregularities reported only in the East.

Scrap prices have been maintained by the purchase of a large tonnage of No. 1 heavy melting steel at \$15, although some weakness has developed in other grades.

Pig Iron.—The reduction of 50c. a ton in Pittsburgh furnace and Valley pig iron quotations last week developed no business, and the market is just about as dull as it has been for several months. The Westinghouse Electric & Mfg. Co. has closed against its recent inquiry for Cleveland and Trafford City, Pa., the latter business having largely been taken by steel company interests. The price is reported to have been in the neighborhood of \$19.50, delivered, which justified the \$18.50, Pittsburgh furnace price on No. 2 foundry iron. Other sales are largely confined to small lots, and in the Valleys prices are also holding at \$18 for foundry and basic iron, and \$18.50 for malleable and Bessemer. The district is very restricted, with Cleveland interests aggressively seeking tonnage on the basis of \$17.50, Cleveland. Valley makers insist that they are not meeting this quotation in their own territory. Stocks of iron on merchant furnace yards are not exceedingly large, but steel companies have been accumulating basic in the last few months. Any large inquiry for this grade would undoubtedly result in sharp price competition. The Struthers furnace is expected to go out of blast on July 20.

Prices per gross ton, f.o.b. Valley furnace:
 Basic \$18.00
 Bessemer 18.50
 Gray forge 17.50
 No. 2 foundry 18.00
 No. 3 foundry 17.50
 Malleable 18.50
 Low phos. copper free \$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:
 Basic \$18.50
 No. 2 foundry 18.50
 No. 3 foundry 18.00
 Malleable 19.00

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

July expected to mark the low level of the year's steel operations.

Mild activity in the heavy tonnage steel products is doing much to balance the light demand for flat rolled steel.

Steel prices still subject to shading with signs of stabilization absent.

Lowered quotations of pig iron failed to bring out any noticeable volume of fresh buying.

Semi-Finished Steel.—Larger makers of billets, slabs and sheet bars are allowing their stocks to decrease, and production is better coordinated with shipments than was the case a month ago. The requirements of small sheet, strip and tin mills are exceedingly light, and new buying is negligible. The price is unchanged at \$31 a ton, Pittsburgh, with forging billets quoted \$5 a ton higher. Shipments of wire rods have declined this month because of the inactivity of bolt and nut makers and other large consumers. The price is unchanged at \$36 a ton, Pittsburgh.

Bars, Plates and Shapes.—With demand still very light, some encouragement is gained from a more stable price structure, which seems to be developing. Although occasional desirable tonnages are still going at sharp concessions in some districts, the general market is somewhat more free of irregularities than has been the case recently. The practice of quoting a flat mill price on combined tonnages of bars, plates and shapes is more frequently encountered, and as a result efforts to maintain bars at \$1 over plates and shapes are being abandoned by some companies. The 1.65c., Pittsburgh, price remains the minimum on the majority of business, while very small lots are bringing slightly more.

Considerable fabricated structural tonnage has come to the larger shops

in the district since the first of the month, but the smaller units are dormant, with operations ranging from 10 to 50 per cent of capacity. The Norfolk & Western has placed 3000 tons of plates, shapes and bars with a Pittsburgh mill for the building of 500 box cars at its Roanoke, Va., shops. Otherwise railroad buying is negligible except for scattered activity in station, pier and bridge work. Car builders in this district are approaching the end of their order books and will have to reduce operations within a month or six weeks, unless new business comes in. Reinforcing bars are active, with shipments this month holding to the high June level.

Rails and Track Accessories.—The Norfolk & Western has closed against its inquiry for 14,000 tons of tie plates. Otherwise new buying is negligible, although specifications for track accessories this month are holding their own. Rail mill production is declining as shipments are being completed on last fall's orders.

Tubular Goods.—The market is again rather quiet, although a few line pipe inquiries are still considered active. With mills booked from three to four months on this class of goods, they are not anxious to make further commitments, and buyers of pipe are hesitant to place tonnage that may not be available this year. Standard pipe is very dull, and shipments of mechanical tubing have declined further because of inactivity in the automotive industry. A fair demand for oil country material is still coming from the Mid-Continent fields, although business on the Pacific Coast is very light.

Wire Products.—The market is very dull, and some business is undoubtedly being held up because of the uncertain price structure on merchant wire products. While nails are holding at \$2.15, Pittsburgh, in the immediate district, shading continues in almost all other parts of the country, with many buyers who can certainly not be termed "preferential" getting concessions of \$1 to \$2 a ton. This weakness is not reflected in demand for manufacturers' wire, which is holding at 2.30c., Pittsburgh.

Sheets.—Production in this and

THE IRON AGE Composite Prices

Finished Steel

July 15, 1930, 2.171c. a Lb.

One week ago.....	2.185c.
One month ago.....	2.214c.
One year ago.....	2.412c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

High	Low
1930 2.362c., Jan. 7;	2.171c., July 15
1929 2.412c., April 2;	2.362c., Oct. 29
1928 2.391c., Dec. 11;	2.314c., Jan. 3
1927 2.453c., Jan. 4;	2.293c., Oct. 25
1926 2.453c., Jan. 5;	2.403c., May 18
1925 2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

July 15, 1930, \$17.09 a Gross Ton

One week ago.....	\$17.25
One month ago.....	17.50
One year ago.....	18.42

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High	Low
1930 \$18.21, Jan. 7;	\$17.09, July 15
1929 18.71, May 14;	18.21, Dec. 17
1928 18.59, Nov. 27;	17.04, July 24
1927 19.71, Jan. 4;	17.54, Nov. 1
1926 21.54, Jan. 5;	19.46, July 13
1925 22.50, Jan. 13;	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c. to 1.75c.
F.o.b. Chicago	1.75c. to 1.85c.
Del'd Philadelphia	1.94c. to 2.04c.
Del'd New York	1.98c. to 2.08c.
F.o.b. Cleveland	1.70c. to 2.05c.
F.o.b. Lackawanna	1.75c. to 1.85c.
F.o.b. Birmingham	1.90c.
C.i.f. Pacific ports	2.25c.
F.o.b. San Francisco mills	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.65c. to 1.75c.
F.o.b. P'gh mills, cut lengths	1.90c. to 2.00c.
F.o.b. Birmingham, mill lengths	1.95c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.65c. to 1.70c.
F.o.b. Chicago Heights mill	1.75c.
Del'd Philadelphia	1.94c. to 1.99c.

Iron

Common iron, f.o.b. Chicago	1.90c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

Base per Lb.

F.o.b. Pittsburgh mill	1.65c. to 1.70c.
F.o.b. Chicago	1.75c. to 1.80c.
F.o.b. Birmingham	1.90c.
Del'd Cleveland	1.83½c.
Del'd Philadelphia	1.85½c. to 1.90½c.
F.o.b. Coatesville	1.75c. to 1.80c.
F.o.b. Sparrows Point	1.75c. to 1.80c.
F.o.b. Lackawanna	1.75c. to 1.80c.
Del'd New York	1.93c. to 1.98c.
C.i.f. Pacific ports	2.25c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh mill	1.65c. to 1.70c.
F.o.b. Chicago	1.75c. to 1.80c.
F.o.b. Birmingham	1.90c.
F.o.b. Lackawanna	1.75c. to 1.80c.
F.o.b. Bethlehem	1.75c. to 1.80c.
Del'd Cleveland	1.83½c.
Del'd Philadelphia	1.83½c. to 1.88c.
Del'd New York	1.90½c. to 1.95½c.
C.i.f. Pacific ports	2.25c.

Hot-Rolled Hoops, Bands and Strips

Base per Lb.

6 in. and narrower, P'gh.	1.75c.
Wider than 6 in., P'gh.	1.65c.
6 in. and narrower, Chicago	1.85c. to 1.90c.
Wider than 6 in., Chicago	1.75c. to 1.80c.
Cooperage stock, P'gh.	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Finished Steel

Base per Lb.

Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	2.45c. to 3.40c.
Strips, P'gh	2.45c. to 2.55c.
Strips, Cleveland	2.45c.
Strips, del'd Chicago	2.73c.
Strips, Worcester	2.60c. to 2.70c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.70c. to 3.80c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
To Merchant Trade

Base per Keg

Standard wire nails	\$2.05 to \$2.25
Cement coated nails	2.05 to 2.25
Galvanized nails	4.15 to 4.25

Base per Lb.

Polished staples	2.60c. to 2.70c.
Galvanized staples	2.85c. to 2.90c.
Barbed wire, galvanized	2.80c. to 2.90c.
Annealed fence wire	2.30c. to 2.40c.
Galvanized wire, No. 9	2.75c. to 2.85c.
Woven wire fence (per net ton to re-tailers)	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage	2.30c.
Spring wire	3.30c.

(Carload lots, f.o.b. Chicago)	
Wire nails	\$2.10 to \$2.15 (keg)
Annealed fence wire	2.40c. to 2.50c. (lb.)
Bright hard wire to manufacturing trade	2.85c.

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

Base per Lb.

No. 10, blue annealed, f.o.b. P'gh	2.00c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.10c.
No. 10, blue annealed, del'd Phila.	2.32c. to 2.42c.
No. 10, blue annealed, B'ham	2.15c. to 2.20c.

Sheets

Blue Annealed

Base per Lb.

No. 13, f.o.b. P'gh	2.15c.
No. 13, f.o.b. Chicago dist.	2.25c.
No. 13, del'd Philadelphia	2.44c.
No. 13, blue annealed, B'ham	2.30c. to 2.35c.

Continuous Mill Sheets

Base per Lb.

No. 10 gage, f.o.b. P'gh	1.80c. to 1.90c.
No. 13 gage, f.o.b. P'gh	1.95c. to 2.05c.

(Usual range 24 in. to 48 in. wide)

Box Annealed, One Pass Cold Rolled

Base per Lb.

No. 24, f.o.b. Pittsburgh	2.45c. to 2.55c.
No. 24, f.o.b. Chicago dist. mill	2.65c.
No. 24, del'd Philadelphia	2.84c.
No. 24, f.o.b. Birmingham	2.70c.

Steel Furniture Sheets

Base per Lb.

No. 24, f.o.b. P'gh	3.70c.
No. 24, f.o.b. Gary	5.35

Standard cokes, f.o.b. Gary..... 5.35

Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills	\$5.25
Standard cokes, f.o.b. Gary	5.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.\$10.30	25-lb. coating I.C.\$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Long Ternes

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series

Alloy Numbers

Differential

2000 (1½% Nickel)	\$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel (flats)	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25

nearby districts continues at about 50 per cent of capacity, with a number of mills not engaged at all. A fortnight suspension among automotive plants is now under way, and shipments to Detroit are at the lowest point of the year. There are indications that the largest maker of motor cars will get back into normal production at the end of the month, as August requirements now reaching mills are in fair volume. Other sheet consuming lines are buying from hand to mouth and demanding immediate shipments.

Tin Plate.—Specifications for tin plate have been rather encouraging in the last few days, as crop reports are generally good, and the larger container manufacturers are pushing their plants to the limit in order to meet current demand. In some cases shipping orders are more urgent than usual, particularly on the Pacific Coast and in the Central West. Operations average 65 to 70 per cent of capacity, with a few mills down for the week. The price is unchanged at \$5.25 per base box, Pittsburgh, although on current new buying preferential prices are being extended to smaller consumers than those who ordinarily enjoy them.

Strip Steel.—With shipments to the automobile industry sharply reduced both this week and next because of plant suspensions, the strip industry is facing the leanest period of the summer. Operations in the hot-rolling mills are not far above 40 per cent of capacity, while cold mills are doing little better than 20 per cent. Prices are well maintained, with mills taking a firmer position than a few weeks ago.

Cold-Finished Steel Bars.—Little or no activity is reported, with shipments to the leading consuming industry at a very low rate. New buying is negligible, and mills are adhering to the 2.10c., Pittsburgh, price in this district. Consumer interest is very low, but quotations are standing the test of small-lot buying in most instances.

Warehouse Business.—Sales out of warehouse are in light volume, with orders principally for small tonnages. With quantity differentials applying on the principal items, profits are not reduced as much as might normally be expected. Reinforcing bars constitute the most active line with some distributors. Sheet steel products are generally dull. The same might be said of nails and wire, while plates and shapes are only fairly active. No price changes are reported, although the 3c. quotation on plates and shapes is subject to some shading and considerable consumer pressure. Bars and light shapes are still quoted at 2.90c.

Coke.—The market is very dull, with the furnace grade holding at \$2.50, Connellsville, on spot sales. Distress material is occasionally go-

ing at lower figures. Foundry coke is also weak, and shipments are light.

Old Material.—Purchase of a large tonnage of No. 1 heavy melting steel by one of the principal consumers in the district at \$15 leaves the market unchanged. Several dealers shared in this order, which called for as much as 30,000 tons. Dealers are experiencing little difficulty in buying against this and other orders at \$14.50, with occasional cars bringing even less. With shipments from Michigan automobile plants almost entirely cut off this month, hydraulic compressed sheets have become especially hard to buy in this district and dealers have paid as much as \$15 to cover orders taken at figures little higher. The other grades of scrap have softened in the absence of mill buying, as well as mill consumption. Dealers are paying \$12.75 for No. 2 heavy melting steel to cover sales at the principal consuming point, and the market is quotable at \$12.50 to \$13, a decline of 50c. from recent levels. Specialties are also weaker, and the blast furnace grades have declined in the absence of a shipping point.

Dealers generally believe the scrap market is dragging bottom, and a turn upward will be watched for with considerable interest because of the light it will throw on the trend of the steel business. Little change is now expected before the first of the month.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.	\$14.50 to \$15.00
No. 2 heavy melting steel.	12.50 to 13.00
Scrap rails	14.00 to 14.50
Compressed sheet steel.	14.75 to 15.00
Bundled sheets, sides and ends	12.00 to 12.50
Cast iron carwheels	14.50 to 15.00

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.35c.
Squares and flats	3.85c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.50c.
Galv. sheets (No. 24), 25 or more bundles	4.15c.
Light plates, blue annealed (No. 10), 1 to 24 plates	2.85c.
Blue annealed sheets (No. 13)	3.00c.
Galv. corrug. sheets (No. 28), per square	4.03c.
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	\$3.30
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb.	\$3.30
Wire, black, soft ann'd, base per 100 lb.	\$2.60 to 2.70
Wire, galv. soft, base per 100 lb.	3.20 to 3.30
Common wire nails, per keg	2.45
Cement coated nails, per keg	2.65 to 2.80

*On plates, structural, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

Sheet bar crops, ordinary	15.50 to 16.00
Heavy breakable cast	11.50 to 12.00
No. 2 railroad wrought	14.50 to 15.00
Hvy. steel axle turnings	12.50 to 13.00
Machine shop turnings	8.50 to 9.00

Acid Open-Hearth Grades:

Railr. knuckles and couplers	17.00 to 17.50
Railr. coil and leaf springs	17.00 to 17.50
Rolled steel wheels	17.00 to 17.50
Low phos. billet and bloom ends	19.00 to 19.50
Low phos. mill plates	16.50 to 17.00
Low phos. light grades	16.50 to 17.00
Low phos. sheet bar crops	17.50 to 18.00
Heavy steel axle turnings	12.50 to 13.00

Electric Furnace Grades:

Low phos. punchings	17.00 to 17.50
Heavy steel axle turnings	12.50 to 13.00

Blast Furnace Grades:

Short shoveling steel turnings	8.75 to 9.25
Short mixed borings and turnings	8.75 to 9.25
Cast iron borings	8.75 to 9.25

Rolling Mill Grades:

Steel car axles	21.50 to 22.50
Cupola Grades:	

No. 1 cast	13.00 to 14.00
Rails 3 ft. and under	16.50 to 17.00

Youngstown

Steel Operations Further Expanded

YOUNGSTOWN, July 15.—Sales executives of district steel companies say that inquiries are more numerous than heretofore. They expect a definite revival in the trade by the middle of August.

By the end of this month the Youngstown Sheet & Tube Co. expects to have its new electric welding pipe mill at the Brier Hill works in commercial production. Much of the equipment for this unit was installed before construction of the building housing the department was undertaken, and the structural work is actually being built around the equipment. In the meantime, the Republic Steel Corporation has a large unfilled tonnage in steel pipe to be worked off its electric welding units.

New business in flat steel is still dormant, however, in the Mahoning Valley. Some improvement is noted, in the requirements from the Studebaker corporation, which recently brought out new models. Ford and Chevrolet, however, are not buying in any volume, while other car builders are only intermittent purchasers. This situation is expected to improve definitely in August.

In the meantime, production is being maintained at a 60 per cent average. Pipe mills rate 65 to 70 per cent; steel bar plants, 60 per cent; tin mills, 50 per cent. Of 120 Valley sheet mills, 48 are scheduled this week; Bessemer steel plants average 55 to 60 per cent, while 28 of 51 independent open-hearth furnaces are active.

The city of Youngstown contemplates a \$1,000,000 bond issue for public works to provide employment for men out of work.

The Youngstown Boiler & Tank Co., Youngstown, is accelerating schedules and increasing employment, due to orders recently received, according to President J. P. Keene. The company last week booked orders for 2000 tons of products, including six 55,000-bbl. oil tanks for the New England Terminal Co., Providence, R. I.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

Per Gross Ton

Rerolling, 4-in. and under 10-in., Pittsburgh	\$31.00
Rerolling, 4-in. and under 10-in., Youngstown	31.00
Rerolling, 4-in. and under 10-in., Cleveland	31.00
Rerolling, 4-in. and under 10-in., Chicago	33.00
Forging quality, Pittsburgh	36.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$31.00
Youngstown	31.00
Cleveland	31.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	\$31.00 to \$32.00
Youngstown	31.00
Cleveland	31.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	.70c.
Universal	.70c.
Sheared	.70c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$36.00
Cleveland	36.00
Chicago	37.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton

Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

Per Unit

Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	10.00c.
Iron ore, low phos., Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed 52% manganese, from the Caucasus	28.00c. to 30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	28.00c. to 30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$14.00 to 16.50

Per Gross Ton

Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
Per Lb.	

Molybdenum ore, 85% concentrates of MoS ₂ delivered	50c. to 55c.
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Coke

Per Net Ton

Furnace, f.o.b. Connellsville prompt	\$2.50
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis..	9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, 3/4-in., f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	.80 to .90
Gas slack, f.o.b. W. Pa. mines	.90 to 1.00

Ferromanganese

Per Gross Ton

Domestic, 80%, seaboard	\$94.00 to \$99.00
Foreign, 80%, Atlantic or Gulf port, duty paid	94.00 to 99.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

Per Gross Ton Delivered

50%	\$83.50
75%	130.00

Per Gross Ton Furnace

10%	\$35.00	12%	\$39.00
11%	37.00	14 to 16%	39.00
12%	30.50	15%	35.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
10%	\$26.50
11%	28.50
12%	30.50
13%	32.50
14%	34.50
15%	37.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6%	\$21.50
7%	22.00
8%	22.50
9%	23.00
10%	24.50
11%	26.50
12%	28.50
13%	30.50
14%	32.50
15%	35.00

Other Ferroalloys

Ferro tungsten, per lb. contained metal del'd

Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads

Ferrovanadium, per lb. contained vanadium, f.o.b. furnace

Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads

Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton

Ferrophosphorus, electric 24%, f.o.b. Alniston, Ala., per gross ton

Ferrophosphorus, electric 24%, f.o.b. Alniston, Ala., per gross ton

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$43.00 to \$46.00	\$35.00 to \$38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00

Magnesite Brick

Per Net Ton

Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

Per Net Ton

Standard size	\$45.00
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Small Rivets

(7/8-in. and smaller)

Per Cent Off List	
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10

Upset hex. head cap screws, U.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5

Milled studs	70
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Discounts of 73 per cent off on bolts and nuts applied on carload business.

Large Rivets

(1/2-in. and larger)

Base per 100 Lb.	
F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00

CHICAGO

Ingot Output Remains Substantially Unchanged— Notably Heavy Pig Iron Sales

CHICAGO, July 15.—With large consumers of finished steel operating on greatly reduced schedules or shut down for vacations, fresh business booked by district mills has barely been enough to support ingot output at 60 to 65 per cent of capacity. Light rolled products especially have felt the depression resulting from the suspension of activities by Ford and other automobile manufacturers. Pipe and plate mills on the other hand have good backlog which in several cases will carry them along until late fall, but their position is in sharp contrast with the general situation.

The leading producer has blown out one blast furnace at Gary, Ind., reducing its number active at that point to 5. In this district it has in blast 12 out of 25 furnaces. Of the grand total of 36 steel mill blast furnaces 19 are running, but the Inland Steel Co. is expected to blow out one of its furnaces for relining in the next few weeks.

Pig iron sales have been the largest in three months. Tonnage buyers are taking advantage of low prices to cover their requirements for the third quarter and in some instances for the entire last half. Merchant pig iron output in the Chicago district is at 65 per cent of rated capacity.

Vacations on the part of many steel consumers are holding up deliveries of finished steel. This applies not only to the automobile industry but also to other classes of customers. The Western Electric Co., employing 55,000 workers, has suspended production for two weeks, in line with its vacation program inaugurated last year, and a large plumbing supply maker in Wisconsin is reported to have closed for a similar period.

Agricultural implement companies have scaled down schedules to the lowest level of the year. Finished stocks on hand are said to be heavy and manufacturers are appraising the farming situation to determine what kind of a market lies ahead for their product next spring. Upon the results of this survey hinges the farm implement production program for the latter half of the year. Meanwhile shipments of steel to the users are meager.

Under the circumstances sentiment in the steel trade is not optimistic. While it is admitted that July has brought a decline to what is thought to be the bottom of the present business cycle, manufacturers agree that the recovery will be very slow and probably will not show any appreciable gain until late August or early September. Producers therefore are arranging their operations with this fact in mind.

The reduction of foundry melt this month has cut down shipments of by-product foundry coke which is firm at \$8 a ton, f.o.b. local ovens.

Pig Iron.—Orders for third-quarter and last-half deliveries have been the best in the last twelve weeks. This is not attributed to a spurt in immediate

demand on the part of consumers but rather to their desire to protect themselves during the remainder of the year at the present price. Some large buyers who ordinarily wait until the most advantageous time to make purchases are reported to have participated in the transactions. On account of decreased foundry operations, pig iron shipments this month have shown a considerable decline. Few open inquiries have appeared in the trade, practically all business having been closed privately in the past week. Northern foundry iron is quoted at \$18, Chicago, although some boat iron is being offered locally at \$17.25 to \$17.50 a ton. The silvery iron market is irregular and schedules are being shaded \$1 or more a ton. A local dealer is preparing to bring a boat load of silvery iron to Chicago from Buffalo in the near future.

Prices per gross ton at Chicago:	
N'th'n No. 2 fdy, sil. 1.75	\$18.00
to 2.25	18.50
N'th'n No. 1 fdy, sil. 2.25	18.00
to 2.75	18.50
Malleable, not over 2.25 sil.	18.00
High phosphorus	18.00
Lake Super. charc'l, sil. 1.50	27.04
S'th'n No. 2 fdy	\$18.01 to
per free	29.50
Silvery, sil. 1 to 2, cop-	27.29
per cent	46.29
Bess. ferrosilicon, 14-15 per	
cent	

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinfor'g bars, billet steel—	
30 to 500 tons	2.00c.
500 tons and over	1.85c.
Rail steel reinforcement	1.65c. to 1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.35c.
Flats and squares	3.85c.
Bands (1/8 in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.60c.
Blue ann'd sheets (No. 10)	3.35c.
Spikes (1/8 in. and larger)	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach or lag screws	60 and 10
Hot-pressed nuts, sq. tap. or blank,	60 and 10
Hot-pressed nuts, hex., tap. or blank,	60 and 10
No. 8 black ann'd wire, per	
100 lb	\$3.45
Com. wire nails, base per keg	\$2.30 to 2.75
Cement c'td nails, base per	
keg	2.30 to 2.75

Bolts, Nuts and Rivets.—Light filling orders are the rule. Total volume is just enough to enable plants to maintain an output of about 45 per cent of capacity. Quotations are firm and unchanged.

Cold-Rolled Strips.—Mill operations have been holding at 25 per cent of capacity, or the same rate as a week ago. With a sharp drop in automobile production this month it is not likely that output will show a gain in the immediate future, and there may be a further dip. Despite the meager volume of business, prices seem to be fairly well stabilized at 2.45c. a lb., Cleveland, or 2.73c. a lb., delivered Chicago.

Wire Rods.—Shipments continue in small lots with quotations firm at \$37 a ton, Chicago.

Wire Products.—The normally rather dull period caused by seasonal influences has been accentuated by the low state of industry. Orders and specifications are filtering in slowly and consumers are carefully avoiding making purchases except to cover immediate requirements. Wire makers likewise are scheduling production to keep pace with current demand and are guarding against accumulating a surplus of materials. Under the circumstances output has been maintained slightly under 50 per cent.

The pressure for business has been applied particularly to wire nails, which now are being sold at \$2.10 to \$2.15 base per keg. Otherwise prices have withstood fairly well the general weakness of the market.

Manufacturers are scanning the agricultural situation to determine what course crops are likely to take and indications are that most products have made satisfactory progress in the past two weeks on account of favorable weather.

Mesh for concrete reinforcement is moderately active. Public utilities are confining purchases to material for construction jobs already under way, even though prices at the moment are unusually attractive.

Rails and Track Supplies.—Railroads are placing small orders for miscellaneous lots of spikes, bolts and tie plates, but show no evidence of buying secondary rail tonnages. With Western carriers cutting down construction and maintenance programs, it is considered unlikely that secondary rail orders in appreciable volume will develop during the summer. Meanwhile rail mill backlog are rapidly diminishing.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. **Per lb.:** Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07 1/2c. to 2.15c.; angle bars, 2.75c.

Bars.—Slackness in the automobile and agricultural implement industries has contributed substantially to a comparatively dull bar market. Neither class of consumer has done more than maintain stocks at the lowest possible level. Mills turning out soft steel bars are operating at 50 per cent of capacity or possibly a few points above that figure.

This is usually the dull season for agricultural implement manufacturers but the low rate of operation in the industry, which approaches total suspension of work, is in marked contrast with the well sustained activities of a year ago and is less than in July of the previous two years. Forging shops are going along on a part-time basis and consequently are making no important purchases. Demand for alloy steel bars has been light and output continues at 50 per cent of capacity. Prices, however, are steady and unchanged.

Cast Iron Pipe.—Springfield, Ill., has taken bids on 350 tons of 18 and 24-in. pipe. Action is expected this week on 2000 tons for Chicago Heights, Ill., and on 300 tons for a sewage disposal plant at Rockford, Ill. Public utilities and railroads are virtually out of the market, and pipe makers report that the amount of business in sight is slim. Prices are unchanged at \$37 to \$38 a ton. Birmingham, with a freight rate of \$8 a ton to Chicago.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$45 to \$46; 4-in., \$48 to \$49; Class A and gas pipe, \$3 extra.

Structural Steel.—Twenty-five hundred tons for a world's fair building at Chicago and 2200 tons for the north approach to the Wabash Avenue bridge, this city, have been awarded to the American Bridge Co., while 1200 tons for State highway bridges in Illinois has been divided between the Vincennes Bridge Co. and the Continental Bridge Co. New bids are due July 22, on 5000 tons for the Lane Technical High School, Chicago. A local apartment building will take 4600 tons, while other projects now being figured will require about 7000 tons of steel.

Fabricating shops have a fair volume of work on their books but not enough to keep them engaged at the present rate for more than a few weeks unless fresh orders are received.

A leading fabricator has sufficient tonnage ahead to run full in its district plant until almost the end of the year.

Plates.—Orders from pipe mills have continued in sufficient volume to put plates in probably the strongest position of all products so far as business at hand is concerned. Shipments to a Milwaukee pipe manufacturer are being made at a good rate and plate mills have a production schedule which will carry them along at the present level up to September.

Reinforcing Bars.—Five hundred thirty tons of bars for Illinois State

Largest sales in three months of pig iron regarded as result of low prices.

One blast furnace went out and another is expected to do so in a few weeks.

Steel operations remain at between 60 and 65 per cent of capacity.

In view of the considerable number of consumer plant vacation suspensions, little gain in steel demand is expected before September.

Nails are lower by 5c. a keg.

Prices of rail steel concrete bars are highly variable.

highway work and 500 tons for a grain elevator at Minneapolis were the principal two lettings of the week. Prices of new billet bars are firm but weakness has appeared in rail steel bars, which are reported to have been offered at concessions of \$2 or more a ton under the regular schedule of 1.75c., Chicago Heights.

Sheets.—Bookings have been poor. Much tonnage usually going into the automobile industry has been held up on account of the July closing down of many automobile factories for two weeks. The electric refrigeration people are nearing the end of their production season for this year and consequently are absorbing less material. Sheet manufacturers have been largely dependent upon small orders from a variety of users for the bulk of their business.

Mills are operating at about 50 per cent, although in some grades of sheets production has been less than 40 per cent. In such an unsatisfactory market, prices have been subjected to further pressure and almost all items are weak.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.70c.; No. 24 galv., 3.30c. to 3.35c.; No. 10 blue ann'd, 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Old Material.—A conservative policy on the part of both consumers and dealers rules the market. Foreseeing an upward turn in prices in the next 30 to 60 days, brokers are covering old orders as rapidly as possible and are trying to get possession of what little scrap is available. However, they are unwilling to contract obligations for large tonnages for future shipment, fearing that an upward trend in the late summer will tighten quotations and wipe out any margin of profit which may now exist. Steel mills on the other hand have refused

to buy heavy melting steel at \$12.25, preferring to wait until bookings warrant an increase in production. While many consumers apparently have large stocks on hand, especially in view of the low level of current operations, dealers are of the opinion that purchases in liberal volume will be necessary as soon as business points to a return to normal.

Good scrap is scarce. Automobile plants are turning out little material this month. Railroad offerings are below normal and other industries producing scrap have only small lots to sell. Moreover, prices have dropped to such a low point that many companies possessing scrap are keeping it off the market, hoping that a month or two hence they can get more money for it.

Hydraulic compressed sheets are off 25c. a ton, now being quoted at \$10.25 to \$10.75. Heavy melting steel also is moving in a narrower range of \$12 to \$12.25.

Railroad lists closing this week are the Santa Fe, 5000 tons; Rock Island, 3500 tons; Chesapeake & Ohio, 7000 tons; Southern, 7000 tons and Louisville & Nashville.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:		
Heavy melting steel	\$12.00 to	\$12.25
Shoveling steel	12.00 to	12.50
Frogs, switches and guards, cut apart, and misc. rails	13.00 to	13.50
Hydraul. compressed sheets	10.25 to	10.75
Drop forge flashings	8.50 to	9.00
No. 1 busheling	9.50 to	10.00
Forg'd cast and r'ld steel carwheels	15.00 to	15.50
Railroad tires, charg. box size	15.50 to	16.00
Railroad leaf springs cut apart	15.50 to	16.00

Acid Open-Hearth Grades:

Steel couplers and knuckles	13.50 to	14.00
Coil springs	16.00 to	16.50

Electric Furnace Grades:

Axle turnings	11.25 to	11.75
Low phos. punchings	13.00 to	13.50
Low phos. plates, 12 in. and under	13.00 to	13.50

Blast Furnace Grades:

Axle turnings	9.50 to	10.00
Cast iron borings	8.00 to	8.50
Short shoveling turnings	8.00 to	8.50
Machine shop turnings	6.25 to	6.75

Rolling Mill Grades:

Iron rails	13.00 to	13.50
Rerolling rails	14.50 to	15.00

Cupola Grades:

Steel rails, less than 3 ft.	13.75 to	14.25
Steel rails, less than 2 ft.	14.50 to	15.00
Angle bars, steel	13.25 to	13.75
Cast iron carwheels	13.50 to	14.00

Malleable Grades:

Railroad	13.50 to	14.00
Agricultural	12.25 to	12.75

Miscellaneous:

*Relaying rails, 56 to 60 lb.	23.00 to	25.00
*Relaying rails, 65 lb. and heav.	26.00 to	31.00

Per Net Ton

Rolling Mill Grades:

Iron angle and splice bars	12.00 to	12.50
Iron arch bars and transoms	13.50 to	14.00

Iron car axles

Steel car axles	24.00 to	24.50
Iron car axles	15.00 to	15.50

No. 1 railroad wrought

No. 1 railroad wrought	10.00 to	10.50
No. 2 railroad wrought	10.75 to	11.25

No. 1 busheling

No. 1 busheling	7.50 to	8.00
No. 2 busheling	6.00 to	6.50

Locomotive tires, smooth

Locomotive tires, smooth	14.50 to	15.00
Pipes and flues	8.00 to	8.50

Pipes and flues

Cupola Grades:

No. 1 machinery cast	12.00 to	12.50
No. 1 railroad cast	10.25 to	10.75

No. 1 agricultural cast

No. 1 agricultural cast	9.50 to	10.00
Stove plate	9.50 to	10.00

Grate bars

Grate bars	8.50 to	9.00
Brake shoes	8.50 to	9.00

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NEW YORK

Spot Orders for Pig Iron Increase—Structural Work Features Steel Market

NEW YORK, July 15.—Pig iron melt is still at a low ebb, although on the upgrade. Here and there jobbing foundries are fairly busy, and an increase in spot orders for iron suggests that some melters underestimated their requirements. Manufacturers of heating equipment, whose operations for months have been adversely affected by the slump in residential construction, are now taking a more hopeful view of the future. A leading company in this category has been encouraged by the success of its "home modernization" campaign.

Sales of pig iron in this district, at 5500 tons, compare with 5000 tons in the previous week and 8000 tons two weeks ago. The Worthington Pump & Machinery Corporation has bought 750 tons for its Harrison, N. J., plant and the American Locomotive Co. has closed against its inquiry for 400 tons for Schenectady, N. Y. The New York Central has bought 175 tons of foundry and 50 tons of charcoal, and the Delaware, Lackawanna & Western is in the market for 100 tons for Scranton, Pa. The Thatcher Co., Newark, N. J., has not yet closed on its inquiry for 2000 tons.

Southern furnaces continue to take a substantial share of the business closed in this district. Base prices are unchanged at \$16, Buffalo; \$18, eastern Pennsylvania furnace, and \$12.50, Birmingham.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25 ..	\$20.91
*Buff. No. 2, del'd east. N. J.....	19.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25 ..	19.39
East. Pa. No. 2X fdy., sil. 2.25 to 2.75 ..	19.89

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Ferroalloys.—In this district, activity in spiegeleisen and ferromanganese is confined to carlot orders and inquiries. The Ford Motor Co. is in the market for 1000 tons of 26 to 28 per cent spiegeleisen and 300 tons of 50 per cent ferrosilicon.

Reinforcing Bars.—Lettings of more than 100 tons are light, although there continues to be a good run of small orders, particularly for highway work. The total volume of bookings, however, is below that of a month ago, but July has frequently shown a recession from June in past years. The large amount of pending work is the basis of hopes for recovery next month. The Cornell Contracting Corporation is low bidder on the Manhattan approach to the Fort Lee bridge, requiring more than 1000 tons.

Concrete bars in 40, 50 and 60-ft. lengths for mill shipment are quoted at 1.75c. to 1.85c. a lb., base Pittsburgh. Warehouse prices range from 2.44c. a lb., f.o.b. cars, New York, for carloads or larger lots to 3.25c. for the smallest tonnages.

Finished Steel.—Activity in structural steel is the high light in an otherwise dull market. Nearly 15,000 tons was awarded to the American Bridge Co. for subway route 108, section 8, and lettings of two office buildings here and a railroad pier in Jersey City accounted for over 9000 tons more. Additional large inquiries have been added to the heavy volume of pending structural work. A telephone building at Walker and Lispenard Streets will require 13,000 tons, while an apartment structure calls for 6500 tons.

In general, demand for finished steel is light. The closing of plants for two weeks is by no means confined to the Detroit district. The Western Electric Co. has shut down its Kearny, N. J., works for a fortnight, and the New York Central Railroad has closed 10 of its shops for a similar period. While these and other suspensions are adversely affecting steel shipments, resumptions on the part of plants that have completed their shutdowns have been followed by the release of shipping orders. Plate fabricators are not particularly busy, but considerable water pipe line and caisson work is said to be in prospect.

Prices on light rolled products tend to give further ground. On black sheets a base price of 2.45c., Pittsburgh, is no longer limited to material taking pickling extras. On No. 10 blue annealed 1.95c., Pittsburgh, is

growing commoner, and on No. 13 gauge 2.05c. is no longer exceptional. On hot strip, 6 in. and wider, 1.60c., Pittsburgh, has been done in some instances.

Warehouse Business.—Buying from stock continues on a small scale with prices fairly well maintained, except on sheets. Black sheets are being sold at 3.65c. a lb., base, and lower, and galvanized sheets, at 4.25c. a lb., are also subject to some concessions. Zinc sheets are off 50c. a 100 lb., the new quotation being 9.75c. to 10.25c. a lb. in casks.

Cast Iron Pipe.—The Consolidated Railways of Cuba have closed on 600 tons of 10-in. water pipe with an American interest. The general contractor for the Westchester County Sewer Commission is understood to have bought about half the total of the required 2500 tons of pipe. Northern foundries continue to operate at 70 to 75 per cent of capacity and better, but prices quoted on recent contracts for pipe have been off slightly, ranging from \$36 to \$37 per net ton, f.o.b. foundry.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$38.90 to \$39.90; 4-in. and 5-in., \$41.90 to \$42.90; 3-in., \$48.90 to \$49.90. Class A and gas pipe, \$3 extra.

Coke.—Prices of furnace coke are still \$2.50 to \$2.60 per net ton, Connellsville, and distress carloads are offered at about \$2.40 per net ton. Foundry coke prices are unchanged, as follows:

Warehouse Prices, f.o.b. New York

Base per Lb.

Plates and structural shapes.....	3.10c.
Soft steel bars, small shapes.....	3.10c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Blue ann'l'd sheets (No. 10).....	3.40c.
Black sheets (No. 24*).....	3.65c. to 3.90c.
Galvanized sheets (No. 24*).....	4.25c.
Long terne sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{2}$ in. and larger.....	3.40c.
Smooth finish, 1 to $2\frac{1}{4}$ x $\frac{1}{4}$ in. and larger.....	3.75c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Machine bolts, cut thread: Off List

$\frac{3}{4}$ x 6 in. and smaller..... 65
1 x 30 in. and smaller..... 65

Carriage bolts, cut thread:
 $\frac{1}{2}$ x 6 in. and smaller..... 65
 $\frac{3}{4}$ x 20 in. and smaller..... 65

Boiler Tubes— Per 100 Ft.

Lap welded, 2-in..... \$19.00
Seamless steel, 2-in..... 20.25

Charcoal iron, 2-in..... 26.25

Charcoal iron, 4-in..... 67.00

Tin Plate (14 x 20 in.) Prime Seconds

Coke, 100 lb. base box... \$6.45 \$6.20

Charcoal, per Box— A AAA

 IC \$9.70 \$12.10

 IX 12.00 14.25

 IXX 13.90 16.00

Special brands of beehive foundry coke, \$4.85 a net ton, ovens, or \$8.56 delivered to northern New Jersey, Jersey City and Newark, and \$9.44 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

Old Material.—Only a few transactions in scrap are reported, and as a rule they have established a slightly lower market. A West Mahwah, N. J., consumer of foundry grade stove plate has bought at \$9.25 per ton, delivered, on a \$2.27 freight rate from New York.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$9.00 to \$10.50
Heavy melting steel (yard)	5.75 to 6.25
No. 1 hvy. breakable cast..	7.75 to 8.50
Stove plate (steel works)..	6.00 to 6.50
Locomotive grate bars...	6.00 to 6.50
Machine shop turnings...	5.00 to 5.50
Short shoveling turnings...	5.00
Cast borings (blast fur. or steel works)....	5.00
Mixed borings and turnings	5.00
Steel car axles	17.00
Iron car axles	19.50 to 20.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.75
Forge fire	7.50
No. 1 railroad wrought..	10.00 to 10.50
No. 1 yard wrought, long..	9.00 to 9.50
Rails for rolling.....	9.50 to 10.00
Stove plate (foundry)...	6.50
Malleable cast (railroad)...	10.50 to 11.00
Cast borings (chemical)...	8.50 to 9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$14.00
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size.....	12.00
No. 2 cast (radiators, cast boilers, etc.)	11.50

PHILADELPHIA

Steel Mill Output Lower—Basic Iron Bought at a Reduction

PHILADELPHIA, July 15.—Steel mill operations have registered a further decline and production of rolling mills in this district is generally about 50 per cent of rated capacity. Open-hearth output is at an even lower level, with mills further reducing their stocks of ingots. Meanwhile, prices lack firmness with concessions not uncommon on desirable orders. Sellers, however, point with some optimism to the trend of operations in steel-consuming industries, which is apparently upward, and it is suggested that steel production is gradually approaching the level of requirements. About 5000 tons of plates, shapes and bars for 500 all-steel box cars have been awarded by the Norfolk & Western to the leading interest.

Pig Iron.—A large user of basic iron has closed on a substantial tonnage at a reduction from the previous quotation on this grade. Foundry iron is being quoted at \$18.50 to \$19 per ton, furnace, by eastern Pennsylvania producers, the higher price applying on small lots for prompt shipment. Southern iron is still a factor in the eastern Pennsylvania market and at the present level Buffalo foundry iron is moving into certain sections of this district. Low phosphorus iron prices continue firm, with only a limited tonnage piled in furnace stocks, which consist largely of standard foundry iron.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sll.	\$19.26 to \$19.76
East. Pa. No. 2X, 2.25 to 2.75 sll.	19.76 to 20.26
East. Pa. No. 1X.....	20.26 to 20.76
Basic (del'd east. Pa.)....	18.25 to 18.50
Malleable.....	21.25
Stand. low phos. (f.o.b. east. Pa. furnace).....	24.00
Cop. b'r'g low phos. (f.o.b. furnace).....	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sll.	22.29
Va. No. 2X, 2.25 to 2.75 sll.....	22.79

Prices, except as specified otherwise, are del'l'd Philadelphia. Freight rates: No. 1 to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Steel Bars.—Buying continues limited to small lots and the price has settled to 1.65c. per lb., Pittsburgh, or 1.94c. per lb., delivered Philadelphia. This quotation has been slightly shaded where bars were sold in combination with shapes.

Reinforcing Bars.—About 1200 tons of reinforcing bars for an administration building in the Philadelphia school district have been awarded to the Concrete Steel Co. Other projects require only small tonnages of bars. Competition between billet and rail steel bars continues keen and prices of billet steel bars range from 1.80c. to 1.85c. per lb., Pittsburgh, or 2.09c. to 2.14c., delivered Philadelphia, with no extra for cutting to length. Rail steel bars are quoted at 1.60c. to 1.65c. per lb., Franklin, Pa., or 1.89c. to 1.94c., delivered Philadelphia, with no extra for cutting to length or bending.

Plates.—On small tonnages composing most of the present business, 1.75c. per lb., Coatesville, Pa., or 1.855c., delivered Philadelphia, is quoted. On the more substantial orders from preferred buyers, and when plates are sold in combination

from 3.10c. to 3.15c. per lb., Pittsburgh, or 3.39c. to 3.44c., delivered Philadelphia. Blue annealed sheets, No. 13 gage are still quoted at 2.15c., Pittsburgh, or 2.44c., delivered Philadelphia, and blue annealed plates No. 10 gage are 2c., Pittsburgh, or 2.29c., delivered Philadelphia.

Imports.—In the week ended July 12, 2222 tons of pig iron arrived at this port, of which 2172 tons was from British India and 50 tons from the Netherlands, 7800 tons of iron ore was received from Algeria and 720 tons of chrome ore from Greece. Steel imports consisted of 554 tons of steel bars, 464 tons of structural shapes and 106 tons of steel bands from Belgium and 2 tons of iron bands from France.

Old Material.—Only small tonnage sales of scrap have been made in the past week, and prices still show a tendency to decline. While the present level of the market is representative of prices paid, or at which dealers are freely offering to sell small tonnages, it might prove difficult to enter into a sizable contract, except at an advance. Yard grade of heavy melting steel is quotable at \$10.25 per ton, on the basis of the latest sale to a consumer, but \$10 per ton, delivered, is more representative of the present market.

*Prices per gross ton delivered consumers'
yards, Philadelphia district:*

No. 1 heavy melting steel..	\$12.50 to \$13.00
No. 2 heavy melting steel..	10.00 to 10.50
Heavy melting steel (yard)	10.25
No. 1 railroad wrought..	15.00 to 15.50
Bundled sheets (for steel works)	9.50
Hydraulic compressed, new	11.00 to 11.50
Hydraulic compressed, old	9.50
Machining shop turnings (for steel works).....	9.00
Heavy axle turnings (or equival.).....	11.50 to 12.00
Cast borings (for steel works and roll. mill)....	8.75 to 9.00
Heavy breakable cast (for steel works).....	11.50 to 12.00
Railroad grate bars.....	10.00
Stove plate (for steel works).....	10.00
No. 1 low phos. hvy., 0.04% and under.....	20.00
Couplers and knuckles...	17.50 to 18.00
Rolled steel wheels.....	17.50 to 18.00
No. 1 blast f'nace scrap...	8.50 to 8.75
Wrot. iron and soft steel pipes and tubes (new specific)	11.50 to 12.00
Shafting	18.00 to 18.50
Steel axles	21.00 to 21.50
No. 1 forge fire.....	12.00
Cast iron carwheels.....	14.50 to 15.00
No. 1 cast.....	13.00 to 13.50
Cast borings (for chem. plant)	13.50 to 14.00
Steel rails for rolling.....	13.50 to 14.00

Production of Electric Power and Consumption of Fuel

	May, 1930	April, 1930	May, 1929
Electric power produced by public utility power plants(a):			
Total, millions of kw-hr.....	8,006	8,000	8,090
Of which, by water-power.....	3,183	3,284	...
Fuel consumed:			
Coal, thousands of net tons.....	3,285	3,258	3,369
Fuel oil, thousands of bbl.....	605	590	...

(a) United States Geological Survey.

CLEVELAND

Production Rebounds 10 Points—Little Change in Prices—Pig Iron Quiet

CLEVELAND, July 15.—The volume of steel business showed little change the past week. The Ford Motor Co. placed orders for a considerable tonnage in sheets, which permitted some of the sheet makers to increase operations, but with that exception very little business came from the motor car industry. A slight gain in business in sheets and hot-rolled strip developed during the week from industries outside the automotive field.

There was a 10 point gain to 50 per cent of ingot capacity by Cleveland steel plants this week, due to the starting up of three additional furnaces by the Otis Steel Co., which now has all of its furnaces in operation. Other Cleveland steel plants are maintaining their recent operating schedule.

Motor car production is now at the low point of the year and there is considerable uncertainty as to how much of a revival there will be during the early fall months. Although the bringing out of new models later in the season is expected to stimulate to some extent sales of medium-priced cars, this increase probably will not be enough to offset the decrease in the schedules of low-priced cars from their production during the early part of the year. The rate of motor car production during the fall will be gauged closely by retail sales, which is a very uncertain quantity.

Industries outside of the motor car field do not report any increase in their plant operations. Most of the plants that are suspending operations for a two weeks or more vacation are doing this during the present month.

There was little change in the price situation the past week. The spread on shapes and plates has been eliminated, the 2.45c. price on black sheets has been given more general recognition and some other products show a weakening tendency.

While there are reports of concessions of \$1 a ton on hot-rolled strip to large users in the motor car field, the regular prices are being maintained in this territory.

Pig Iron.—With reduced demand from the automotive industry and many foundries in other fields shut down for two or more weeks, shipping orders this month show a rather sharp decline from June. Consumers are not taking much interest in the market and sales continue slow. One Cleveland interest sold 6000 tons during the week. Stocks in foundry yards are light. With curtailed demand for steel-making iron, some of the steel plants appear to be exerting greater effort than recently to sell merchant iron. A Kokomo foundry that inquired for 1000 tons of malleable iron bought only about one-half that tonnage. Among inquiries is one for approximately 1000 tons of foundry iron from a northeastern Ohio melter. Prices show a weaker tendency. A local producer is quoting foundry iron at \$17 for shipment to competitive points or \$1 a ton below the open quotation and appears to have become a competitive factor in the Pittsburgh district, where its delivered price is

\$19.65 as compared with \$19.76 for Valley iron at \$18 furnace. For local delivery \$18 is being maintained. Quotations on foundry and malleable iron in western Ohio and northern Indiana range from \$17.50 to \$18 as compared with the recent flat \$18 price. The differential in Michigan has been abolished, the \$18.50 price now applying to both the western and eastern parts of the State.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$18.00
S'th'n fdy., sil. 1.75 to 2.25	\$18.51 to 19.51
Malleable	18.00
Ohio silvery, 8 per cent..	25.50 to 26.50
Basic Valley furnace....	18.50
Stand. low phos., Valley...	26.50 to 27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore.—Ore shipments continue at about the recent rate. The amount on docks July 1 was 4,612,638 tons as compared with 4,082,400 tons on the same date a year ago, according to the monthly report of the Lake Superior Iron Ore Association. Receipts at Lake Erie ports during June were 5,754,539 tons and for the season 9,751,797 tons as against 14,928,976 tons during the same period last year.

Strip Steel.—A few of the mills report a slight gain in orders for hot rolled strip from industries outside of the automotive field, although the total volume is light. Prices are firm at 1.65c. Pittsburgh for wide strip and 1.75c. for narrow. Cold-rolled strip is less active than the hot-rolled material. The usual quotation is 2.45c. Cleveland, the 2.55c. price having virtually disappeared.

Bolts, Nuts and Rivets.—Demand for bolts and nuts continues quiet, being about at the same rate this month as during June, which was 10 per cent less than May. Some of the bolt and nut manufacturers have closed down their plants for two or three weeks. The industry is not operating at over 40 to 50 per cent of capacity. Rivets are also dull with plant operations around 50 per cent.

Bars, Plates and Shapes.—Steel bar business has picked up slightly this month but activity in shapes has declined. Orders generally are small and for early needs. Business is very slack with local forge shops, which consequently are ordering little ma-

terial. Building activity is light, the only award of the week being 1250 tons for the Cleveland school of administration building. Plates and shapes have settled to a flat 1.65c., Pittsburgh price, 1.70c. having virtually disappeared. Steel bars are quoted at 1.70c., Cleveland, for outside shipment and 1.75c., delivered to local consumers.

Sheets.—Orders for good-sized lots were placed during the week by the Ford Motor Co., shipments to start in time for use when this company resumes operations July 28, and some of the mills having Ford orders increased operations this week. On black sheets the 2.45c., Pittsburgh price, which has been in evidence for several weeks, has become more general and is now being openly quoted by at least one mill, although some makers are still holding to 2.55c. On galvanized sheets 3.15c. has become more common.

Wire Products.—Apparently reflecting conditions in other districts, nail prices are softer and are now quoted at a range of 2.05c. to 2.15c., Cleveland. Demand for wire is slack. The 2.30c. price is being maintained.

Cold-Finished Steel Bars.—While the price has not been tested since the recent reduction on hot-rolled bars, the market has a weak tone and a fair inquiry, it is believed, would probably bring out a 2c. price, or a reduction of \$2 a ton.

Old Material.—The market is weaker with price declines of 25c. to 50c. a ton on heavy melting steel, borings and turnings and short shoveling turnings. Small lot purchases were made by dealers during the week at \$12 for No. 1 heavy melting steel and \$9 for borings.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel..	\$11.75 to \$12.25	
No. 2 heavy melting steel..	11.25 to 11.50	
Compressed sheet steel....	12.25 to 12.50	
Light bundled sheet stampings	11.00 to 11.50	
Drop forge flashings.....	10.00 to 10.50	
Machine shop turnings....	8.00 to 8.50	
Short shoveling turnings..	9.75 to 10.25	
No. 1 railroad wrought..	13.00 to 13.50	
No. 2 railroad wrought..	14.00 to 14.50	
No. 1 busheling.....	11.75 to 12.00	
Pipes and flues.....	9.00 to 9.50	
Steel axle turnings.....	12.50 to 13.00	

Acid Open-Hearth Grades:		
Low phos., forging crops..	17.75 to 18.00	
Low phos., billet bloom and slab crops.....	18.50 to 18.75	
Low phos., sheet bar crops	18.00 to 18.50	
Low phos., plate scrap....	18.00 to 18.50	

Blast Furnace Grades:		
Cast iron borings.....	9.00 to 9.25	
Mixed borings and short turnings	9.00 to 9.25	
No. 2 busheling.....	8.75 to 9.00	

Cupola Grades:		
No. 1 cast.....	15.00 to 15.50	
Railroad grate bars.....	11.00 to 12.00	
Stove plate	12.00 to 12.50	
Rails under 3 ft.....	18.50 to 19.50	

Miscellaneous:		
Rails for rolling.....	16.25 to 16.50	
Railroad malleable	16.00 to 16.50	

DETROIT

Automobile Output Reaches Low Point of Year— Steel Prices Sensitive

DETROIT, July 14.—Automobile production this month is likely to fall to the lowest point of the year. With numerous plants closing for an average of two weeks, thereby reducing the actual July working schedule to perhaps 10 days or less, it is not surprising that the month's output is expected to drop under the 236,000 units of January.

The Ford Motor Co. suspended operations on Friday evening, July 11, and will not resume activities until Monday, July 28. Since Ford has been responsible for considerably more than half of the industry's production of late, this shutdown will cut deeply into July figures. The Ford company's program for the last few days of this month and the first 10 days of August is reported to be 6500 cars a day on the basis of five days a week. The August output has been set tentatively at about 130,000 units, but this figure probably will be revised to conform to developments in the retail market as the summer progresses.

Chevrolet's June shipments were in the neighborhood of 75,000 to 80,000 units, with between 55,000 and 60,000 as the July goal. In view of the dullness of business, it is not unlikely that the month's total will fall somewhat short of the goal. So far as August is concerned, further curtailment will be in order, unless the current trend stops its downward course.

The Hudson-Essex plant started turning out cars today after a two weeks' shutdown. The Oakland-Pontiac division of General Motors will be closed from July 18 to Aug. 4, while the Fisher Body factory at Pontiac is reported to go down at the same time. Durant-Rugby at Lansing and Hupmobile at Detroit and Cleveland also are expected to be down for two weeks during the mid-summer period.

The Buick Motor Co. is now getting into production on its new models and has a July schedule of 19,000 cars, compared with slightly more than 4000 in June. The Flint, Mich., division of the Fisher Body Co. will be kept busy this month supplying Buick with its requirements, but the Detroit plants of this company are said to be operating at a low rate.

Chrysler is reported to be manufacturing 900 units a week, DeSoto 850 and Dodge 1550. Oldsmobile-Viking is producing about 250 cars a day, working three and a half days a week. Oakland-Pontiac's output has been maintained at 450 daily on a four-day week. Nash is making model changes and is running on a schedule of 400 cars a day, four days a week.

The innovation of "free wheeling"

as a feature of the new Commander and President models of Studebaker is attracting wide interest on the part of the automobile trade. Concurrent with the public announcement of its new product, the Studebaker Corporation at South Bend,

hand. Therefore, the slightest gain in sales will be felt immediately by the manufacturing trade. This is one of the bright spots in an otherwise rather drab picture.

Following closely the activities in automobile manufacturing, automobile parts makers have curtailed their programs. June was not a satisfactory month for them, and July will be worse. In some cases shutdowns have coincided with suspension of operations in automobile plants. Although releases of shipments by automobile manufacturers have been poor, replacement orders have been fair.

The holiday movement which has swept the automobile industry this month, resulting in so-called vacation and inventory layoffs, has seriously restricted the demand for steel, especially for light-rolled products. It has not only reduced steel orders to a low point, reaching a standstill at times, but also played havoc with the price structure. There is scarcely a mill which is not hungry for business; consequently buyers are pressing for the advantage of special concessions and seem able to get them in some instances. In several products sellers frankly confess that they do not know what price is representative of the market. However, they are attempting to hold their items at current levels, believing that prices are now scraping bottom and that with the expected impetus to business in the early fall the structure will be considerably strengthened.

In the past few days the Great Lakes Steel Corporation has completed construction of six 150-ton open-hearth furnaces at Ecorse, Mich., just below Detroit on the Detroit River. One or two furnaces will be lighted probably this week to be warmed up and the company will begin pouring steel some time in August. Production will be increased as business warrants. A new hot strip mill will be put into operation in September or October. It will be capable of rolling strip 16 gage and heavier in widths up to 33 in. The plant will consist of Mesta four-high finishing mills and complete equipment for pickling, oiling and normalizing. The company also is constructing a 14-in. merchant bar mill, which should be ready in January, 1931. A blooming and billet mill to prepare slabs for the strip mill and billets for the bar mill is now nearing completion.

Foundries catering to the automobile trade have been melting only small quantities of iron. There is scarcely a foundry that has been operating more than two days a week and one large plant supplying castings to a leading automobile manufacturer is reported to have run at 10 per

Ford operations were suspended July 11 until July 28. Schedule for first 10 days of August is 6500 cars daily.

* * *

Chevrolet shipped 75,000 to 85,000 units in June and aim to turn out 55,000 to 60,000 this month.

* * *

Buick's July schedule is 19,000 cars, compared with an output of slightly more than 4000 in June.

* * *

Model changes are causing buyers to postpone purchases. However, dealers' stocks are low; the number of used cars in the market is not excessive.

* * *

The sharp reduction in automotive steel orders has further unsettled prices.

Ind., is producing 450 to 500 units daily this week.

Willys-Overland is planning a July output of 8000 units. Cadillac-La Salle has approximately 55 cars coming off its assembly lines daily, four days a week. The Plymouth division of Chrysler produced 2200 units last week. The Reo plant at Lansing is operating on a basis of 60 units a day, four days a week. Marmon-Roosevelt at Indianapolis today is resuming activities following a two weeks' vacation and inventory period.

Retail automobile sales are reflecting a downward seasonal trend. Advertisements of changes in models, as well as rumors of further changes in the near future, have had a disturbing effect on the buying public, which is inclined toward a "watchful waiting" policy to make sure that it is getting the latest engineering developments. Naturally the unsettled business situation also has been a contributing factor toward slowing down retail orders. However, the retail automobile market is in a healthy condition, with dealers' stocks exceptionally low and only a moderate volume of used cars on

cent of capacity in the past month. Current operations generally indicate what may be anticipated 30 days ahead in the output of finished automobiles. If this index can be taken as fairly accurate, August automobile production, with the exception of Ford, will not be better, and may be less, than July.

Pig iron has been sold only in small lots to cover immediate needs. The only encouraging feature is the fact

that consumers have reduced stocks almost to the vanishing point and any pickup in the foundry trade will instantly be reflected in a betterment in the demand for pig iron.

District sheet mills, which until recently have been sustaining operations at a comparatively high rate, have been compelled to cut down schedules this month to be in line with the substantial decline in specifications and orders.

CINCINNATI

Southern Pig Iron Drops 50c—Steel Scrap Higher

CINCINNATI, July 15.—With the melt still shading, the demand for pig iron in this district declined sharply last week. Total sales covered about 2025 tons, of which 200 tons was Southern iron. Southern iron continued to be noticeably weak and furnaces are now accepting orders for quantities as small as 100 tons at \$12.50, base, Birmingham. On car-load orders, the price is still \$13, base, Birmingham, but even this quotation appears to be weak.

While most furnace representatives continue to express optimism, the trade generally feels that little or no improvement can be expected before the fall. A Detroit, Mich., consumer is in the market for 1000 tons of foundry iron and the Ford Motor Co. is inquiring for 1000 tons of spiegel-eisen.

Prices per gross ton, deliv'd Cincinnati:
So. Ohio fdy., sil. 1.75 to 2.25 \$20.89 to \$21.39
Ala. fdy., sil. 1.75 to 2.25 16.19 to 17.69
Ala. fdy., sil. 2.25 to 2.75 17.19 to 18.19
Tenn. fdy., sil. 1.75 to 2.25 17.19 to 17.69
S'th'n Ohio silvery, 8 per cent 26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Coke.—The district coke market is unusually quiet. New business is a rarity and the specifications against current contracts are below last month.

Finished Material.—With the automotive demand sharply below normal and demand from other fields slow,

district mill operators are holding schedules to about 40 per cent of capacity in keeping with the demand. Manufacturers report that sales from the road construction field, however, are fairly large and in fact current operations depend largely on this demand. Prices are holding firmly, since it is the feeling that present quotations are on the bottom.

Old Materials.—A slight increase in activity of heavy melting steel, last

week, brought an increase of 25c. a ton in dealers' bidding. While this slight flurry has not boosted other prices, it has contributed an undertone of firmness to the entire list. Dealers' prices, however, are still low and in many instances are tending to freeze the source of supply. In fact, last week, instances were reported of dealers withdrawing offers to sell scrap because of the inability to buy advantageously. The Louisville & Nashville Railroad has published a list of 8400 tons and the Southern Railroad is offering 12,000 tons.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	\$11.25 to \$11.75
Scrap rails for melting	11.75 to 12.25
Loose sheet clippings	8.00 to 8.50
Bundled sheets	10.00 to 10.50
Cast iron borings	8.00 to 8.50
Machine shop turnings	7.50 to 8.00
No. 1 busheling	9.50 to 10.00
No. 2 busheling	6.00 to 6.50
Rails for rolling	13.00 to 13.50
No. 1 locomotive tires	13.50 to 14.00
No. 2 railroad wrought	11.25 to 11.75
Short rails	17.00 to 17.50
Cast iron carwheels	12.00 to 12.50
No. 1 machinery cast	17.50 to 18.00
No. 1 railroad cast	14.50 to 15.00
Burnt cast	8.25 to 8.75
Stove plate	8.25 to 8.75
Brake shoes	8.25 to 8.75
Agricultural malleable	14.00 to 14.50
Railroad malleable	15.00 to 15.50

BIRMINGHAM

Pig Iron Stocks Accumulate—Steel Production Is Sustained

BIRMINGHAM, July 15.—Shipping instructions are coming in better as foundries resume operations following shutdowns averaging three to six days, but the movement is still under the make. The gain in furnace stocks during the past 60 days is estimated at 6 to 7 per cent of the total output.

Inquiries are scanty and buying is largely for nearby requirements. Outside territories have recently contributed a few round tonnages to the sales. The price on district sales remains at \$14, while concessions of \$1 to \$2 a ton continue to be reported in the competitive territories. Furnace operations are the same. Of the 15 active furnaces, eight are on foundry iron, six on basic and one on ferromanganese.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil. \$14.00
No. 1 fdy., 2.25 to 2.75 sil. 14.50

Basic 14.00

Finished Steel.—Inquiries improved last week and a fair tonnage is before the trade. New business in several lines has been below the output during the past two weeks but there has been some accumulation in the pending tonnage during this time. Sheet bookings do not show the tonnage of this time last year but they compare favorably with those at this season in 1928. Prices are fairly steady, individual sales being too small to demand important concessions. The bar rod and wire mills of one company are to be placed in operation again this week

on a light scale after being closed down two weeks.

The light bookings of structural steel have been disappointing in view of the heavy tonnage on the pending list. About 1000 tons for a new transit shed at the Alabama State Docks is included in the new inquiries.

Active open-hearts this month so far have totaled 14 out of a total of 23 furnaces.

Cast Iron Pipe.—Pressure pipe manufacturers report the pending tonnage to be well above the average of recent weeks, though orders are still confined to small lots. The outstanding municipal project at present is 3000 tons at Hattiesburg, Miss., for which bids will be opened July 17. New inquiries include 7800 ft. of 14-in. pipe to be awarded by Greenville, Miss., on July 21. A few small municipal projects are pending in Texas. The American Casting Co. has received an order from the Atchison, Topeka & Santa Fe Railroad for 500 to 1000 tons of cast iron culverts. Plants resumed operations last week after the holiday shutdown with only a slight reduction from the previous schedule. Operations are estimated to be between 50 and 60 per cent of capacity. Quotations are the same, \$37 to \$88 a ton, Birmingham, being asked on 6-in. and larger diameters.

Coke.—The foundry coke market is experiencing the quietest July in years. Shipping specifications are for small tonnages. The base price is

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforce. bars	3.30c.
Rail steel reinforce. bars	3.15c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.	3.80c.
Squares	4.30c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'd sheets (No. 10)	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'd wire, per 100 lb.	\$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c'td nails, base 100 lb. keg	2.95
Chain, per 100 lb.	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.	\$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

unchanged from \$5 a net ton, Birmingham.

Old Material.—As far as the consumer trade is concerned the activity is hardly worth mention. The two largest users of steel scrap have ordered all shipments suspended due to heavy stocks and light operations. Other steel scrap consumers have light stocks but their meager operations do not require even these supplies. The cast iron grades are still

at a standstill. Actual prices are undeterminable.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:		
Heavy melting steel.....	\$12.00	
Scrap steel rails.....	\$12.50 to 13.00	
Short shoveling turnings.....	9.00	
Cast iron borings.....	9.00	
Stove plate.....	11.50 to 12.00	
Steel axles.....	20.00	
Iron axles.....	23.00	
No. 1 railroad wrought.....	10.00 to 10.50	
Rails for rolling.....	14.50	
No. 1 cast.....	13.00	
Tramcar wheels.....	12.50	
Cast iron carwheels.....	13.00 to 13.50	
Cast iron borings, chem.....	13.50 to 14.00	

PACIFIC COAST

SAN FRANCISCO, July 12.—(By Air Mail)—Activity in the Pacific Coast markets has not yet recovered the ground lost last week due to the holidays. Featuring bookings were 7500 tons of structural shapes, the largest project of the year, and 500 tons of reinforcing bars for the Aurora Avenue bridge at Seattle, placed with the Columbia Steel Co.

The price situation is being well maintained not only on mill shipments but on stocks from distributors' warehouses.

Demand for reinforcing steel bars has improved, especially as it applies to specifications for highway and general engineering construction work. An unnamed interest took 438 tons for highway work in San Mateo County, Cal. Numerous small projects, taking lots of 20 to 60 tons, were reported placed. Included among new inquiries are 277 tons for a subway in Tucson, Ariz., 275 tons for highway work in Yuba City, Cal., and 200 tons for a warehouse in Los Angeles. Out-of-stock prices continue unchanged in the San Francisco district at 2.30c., base, on carload lots. Merchant bar material still moves in relatively small lots. Quotations on this class of material are firm at 2.25c., c.i.f.

The Western Pipe & Steel Co. booked 2027 tons of plates for the Bully Creek and Fairman Coulee siphons at Vale, Ore., and also 598 tons for a 42 and 54-in. welded steel pipe line for the Salyer Consolidated Mining Co., near Eureka, Cal. Bids are expected to be called for next month on close to 10,000 tons for a pipe line at Seattle and on over 1000 tons for a pipe line at Anacortes, Wash. Prices range from 2.15c. to 2.25c., c.i.f.

In structural lines new inquiries include 473 tons for the subway in Tuc-

Large Structural Steel and Fabricated Plate Business

son and 1800 tons for a State building in Los Angeles. Bids have been opened on 168 tons for a bridge over the Trinity River in California and on 137 tons of sheet steel piling for the U. S. Engineer Office at Sacramento. Plain shapes are firm at 2.35c., c.i.f.

Pig Iron.—Movement continues to be confined to unimportant tonnages, the majority of sales and inquiries calling for lots of less than 100 tons.

Pig Iron Prices Per Gross Ton at San Francisco

*Utah basic,	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Cast Iron Pipe.—Only two awards of importance are noted. The U. S. Pipe & Foundry Co. took 265 tons of 12 and 16-in. Class B pipe for San Francisco and C. G. Claussen & Co. secured 499 tons of 16-in. Class B and C pipe for Olympia, Wash. Bids were opened on 537 tons of 6-in. Class C pipe for Vancouver, B. C. San Francisco will open bids on July 14 for 260 tons of 6-in. Class 150 and 10-in. Class 250 and on July 21 for 771 tons of 6 and 8-in. Class 150 pipe. Eureka, Cal., will open bids on July 15 for 140 tons of 4 to 8-in. centrifugally cast pipe.

Westinghouse Will Have Spanish Interest

The Westinghouse Electric & Mfg. Co., East Pittsburgh, through its subsidiary the Westinghouse Electric International Co., has joined a group of Spanish industrial leaders in the formation of a new company, to be known as Constructora Nacional Maquinaria Electrica, which will manufacture electric generators, motors, transformers, and other electrical apparatus in Spain.

Bids will be accepted by the chief engineer of the Maine State Highway Commission until July 29 on the Waldo-Hancock bridge across the Penobscot River near Bucksport, Me.

Canada

Considerable Fabricated Work in Sight

TORONTO, July 15.—With indications of curtailed operations before the end of this quarter, the various Canadian raw material markets are now beginning to feel the pinch. In pig iron new business is listless. Forward delivery buying has practically ceased, and there has recently been a noticeable falling off in spot sales. Local blast furnace representatives refuse to make predictions relating to the last quarter.

The railroads may place additional rail and rolling stock contracts before the end of the year. Such action might help tide over some of the larger producing firms until the domestic market and world trade take a turn for the better. Merchant pig iron sales totaled under 1000 tons. Melters throughout Ontario and Quebec are running on a hand-to-mouth basis and have iron supplies sufficient for only a week or two. Pig iron producers look for a steady flow of small tonnage spot delivery orders throughout the quarter, but it is now something of a question as to whether the consumption of iron will hold its present advantage over that of 1928. Sales of foreign iron in the Canadian market are also much lower than those of either 1928 or 1929. Imports are reported at well under 2000 tons monthly from all sources. Pig iron prices are unchanged.

Prices per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable	24.00
Basic	22.50

Imported Iron, Montreal Warehouse	
Summerlee	\$33.50
Carron	33.00

Structural Steel.—Fabricators report that small tonnage orders are fairly numerous and total weekly sales are in good volume. About 5000 tons of steel will be required for the proposed Lachine-Caughnawaga Bridge at Montreal, but no definite news is available as to closing dates. Several other projects for Montreal will call for about 20,000 tons, to be closed within the next month. In the Toronto district, demand is confined to tonnages below 500 tons, but total prospective business amounts to about 15,000 tons. Several large projects announced earlier in the year will be held up for some time. Fabricators, however, are busy working off backlog.

Old Material.—The uncertainty that holds in other iron and steel markets has settled strongly over the old material market. Consumers are buying sparingly for immediate requirements, but little or no future con-

Warehouse Prices, f.o.b. San Francisco

Base per Lb.
Plates and struc. shapes..... 3.40c.
Soft steel bars..... 3.40c.
Black sheets (No. 24)..... 4.35c.
Blue ann'd sheets (No. 10)..... 3.80c.
Galv. sheets (No. 24)..... 5.00c.
Struc. rivets, 1/2-in. and larger..... 5.00c.
Com. wire nails, base per keg..... 3.35c.
Cement c'td nails, 100 lb. keg..... 3.35c.

tract placing is being done. The mills are taking delivery on old contract account and are placing spot delivery orders from time to time for special grades of steel scrap. Foundry interests are showing but passing interest and placing orders for immediate needs. Dealers, in turn, are buying sparingly. Yards are well stocked, and new purchases are for direct shipment to consumers. Price lists are unchanged.

Dealers' buying prices for old material:

Per Gross Ton

	Toronto	Montreal
Heavy melting steel	\$9.00	\$8.00
Rails, scrap	10.00	8.00
No. 1 wrought	9.00	11.00
Machine shop turnings	6.00	5.00
Boiler plate	7.00	6.50
Heavy axle turnings	7.00	6.00
Cast borings	6.50	5.00
Steel borings	6.50	6.00
Wrought pipe	4.00	4.00
Steel axles	10.00	13.00
Axes, wrought iron	12.00	15.00
No. 1 machinery cast	12.00	12.00
Stove plate	10.00	10.00
Standard carwheels	10.50	10.00
Malleable	10.00	10.00
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<i>Per Net Ton</i>		
No. 1 mach'y cast	11.00	11.00
Stove plate	9.00	9.00
Standard carwheels	10.00	10.00
Malleable scrap	9.00	9.00

Detroit Considers Scrap at Bottom

DETROIT, July 15.—The general feeling among the dealers in this district seems to be that prices on waste material are on the bottom and they anticipate enough activity in buying within the next 30 days to substantiate this belief. Borings, short turnings, long turnings and new No. 1 busheling registered declines of 25c. a ton.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov.	\$11.00 to \$11.50
Borings and short turnings	7.00 to 7.25
Long turnings	5.75 to 6.25
No. 1 machinery cast	11.25 to 11.75
Automotive cast	13.50 to 14.00
Hydraul. comp. sheets	10.50 to 11.00
Stove plate	9.00 to 9.50
New No. 1 busheling	9.50 to 10.00
Old No. 1 busheling	8.75 to 9.25
Sheet clippings	8.00 to 8.50
Flashings	9.75 to 10.25

Warehouse Prices, f.o.b. St. Louis

Base per Lb.

Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	4.90c.
Structural rivets	4.15c.
Boiler rivets	4.15c.

Per Cent Off List

Tank rivets, $\frac{1}{4}$ -in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

ST. LOUIS

Cut in Southern Pig Iron and in Heavy Tonnage Steel Products

ST. LOUIS, July 15.—Although stocks of pig iron in hands of melters in this district are said to be the lowest in years, there is no disposition to buy for third quarter shipment in any volume because of a falling off in demand for finished products. When the pick-up in demand does increase, there will be a rush of pig iron orders. Southern makers are reported to be eager for business, and sales have been made here at \$12.50, Birmingham, a reduction of 50c. a ton. The hottest weather since 1901, exceeding 100 deg. daily, has been a factor in reducing foundry activity.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$18.00 to \$18.50
Malleable, f.o.b. Granite City	18.00 to 18.50
N'th'n No. 2 fdy., deliv'd St. Louis	20.16
Southern No. 2 fdy., deliv'd	16.92
Northern malleable, deliv'd	20.16
Northern basic, deliv'd	20.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Iron and Steel.—The price of 1.80c. on plates, shapes and bars established for third quarter has been reduced to 1.75c., except on small orders, with buying light. Railroads have failed to place any third quarter orders for these items, on which they had asked prices, and only a small amount of business is coming from this source. Warehouse business for the first half of the year is approximately 20 per cent under the same period last year. Not much improvement is expected until September. Structural trade is exceedingly light.

Old Material.—The only transaction of the week worth recording was the sale of heavy melting steel for shipment after July 20 to an East Side mill, which has withheld ship-

ment on all items until the date named. Mills in the district generally are buying very little. Some dealers are laying down material. Cast iron borings and shoveling turnings are down 75c. a ton, the leading consumer in the district having ceased buying. No. 1 busheling is 25c. less, and No. 1 railroad wrought, No. 1 railroad cast and stove plate are 50c. lower. Railroad lists include: International-Great Northern, 13,304 tons; Baltimore & Ohio, 9250 tons; Louisville & Nashville, 8463 tons; Chesapeake & Ohio, 6327 tons; Missouri-Kansas-Texas, 1115 tons; Wabash, 560 tons; Standard Oil Co. of Indiana, 217 tons; Chicago, Rock Island & Pacific, 60 carloads; New York, Chicago & St. Louis, 51 carloads; Great Northern, 26 carloads; and the Pullman Co. (St. Louis), 60 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	\$11.00 to \$11.50
No. 1 heavy melting or shoveling steel	10.75 to 11.25
No. 2 heavy melting or shoveling steel	10.00 to 10.50
No. 1 locomotive tires	13.00 to 13.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	11.25 to 11.75
Railroad springs	13.25 to 13.75
Bundled sheets	7.50 to 8.00
No. 2 railroad wrought	10.75 to 11.25
No. 1 busheling	9.00 to 9.50
Cast iron borings and shoveling turnings	8.50 to 9.00
Iron rails	10.00 to 11.00
Rails for rolling	12.00 to 12.50
Machine shop turnings	6.00 to 6.50
Heavy turnings	8.50 to 9.00
Steel car axles	15.50 to 16.00
Iron car axles	24.50 to 25.00
Wrot. iron bars and trans.	14.00 to 14.50
No. 1 railroad wrought	8.00 to 8.50
Steel rails, less than 3 ft.	13.50 to 14.00
Steel angle bars	10.25 to 10.75
Cast iron carwheels	12.00 to 12.50
No. 1 machinery cast	12.00 to 12.50
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	11.00 to 11.50
Stove plate	9.50 to 10.00
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00
Agricult. malleable	10.00 to 10.50

BUFFALO

Steel Production Has Been Stepped Up—Concrete Bars Give Most Promise

BUFFALO, July 15.—Demand for pig iron is not much heavier than it has been for the last two weeks. Furnaces report sales of approximately 3000 tons in all. Two sizable inquiries are out at the present time, one for 1000 tons of malleable iron and one for 1000 tons of foundry. Several factories have closed down for the first two weeks in July. The General Electric inquiry previously noted has not yet been placed, according to local reports.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$18.50
No. 2X fdy., sil. 2.25 to 2.75	19.00
No. 1 fdy., sil. 2.75 to 3.25	20.00
Malleable, sil. up to 2.25	19.00
Basic	17.50
Lake Superior charcoal	27.28

Finished Steel.—There has been little change in the scale of operations.

The Lackawanna plant of the Bethlehem Steel Co. has increased the number of active open-hearth furnaces from 12 to 13. Eight of its mills are on single turn and four on double turn. Donner operation remains at three. Seneca Iron & Steel Co. is operating in a spotty way, with its

Warehouse Prices, f.o.b. Buffalo

Base per Lb.	
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$3.20
Black wire, base per 100 lb.	3.50

present rate at about 50 per cent. The prospects for improvement in the finished steel business seem rather indefinite. Ford Motor Co. will require 200 to 300 tons of reinforcing bars for its plant being erected in the outer harbor. A better volume of reinforcing bar contracts is reported, and this seems to be the brightest spot in the finished steel line at the present time. Structural business is slow.

Old Material.—No sales of consequence have been reported and the market is dull and strictly nominal. Certain sagging of prices under these conditions is noted.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:

No. 1 heavy melting steel	\$13.00 to \$13.75
No. 2 heavy melting scrap	11.50
Scrap rails	12.00 to 12.50
Hydraulic comp. sheets	11.50
Hand bundled sheets	9.00 to 9.50
Drop forge flashings	11.50
No. 1 busheling	11.75 to 12.75
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	7.00 to 7.50
No. 1 railroad wrought	10.00 to 10.50

Acid Open-Hearth Grades:

Knuckles and couplers	15.00 to 15.50
Coil and leaf springs	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Low phos. billet and bloom ends	16.50 to 17.00

Electric Furnace Grades:

Short shov. steel turnings	10.50 to 10.75
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Blast Furnace Grades:

Short mixed borings and turnings	9.25 to 9.75
Cast iron borings	9.25 to 9.75
No. 2 busheling	7.00

Rolling Mill Grades:

Steel car axles	16.00 to 16.50
Iron axles	19.00 to 19.50

Cupola Grades:

No. 1 machinery cast	12.00 to 12.50
Stove plate	10.75 to 11.00
Locomotive grate bars	9.00 to 9.50
Steel rails, 3 ft. and under	16.00 to 16.50
Cast iron carwheels	13.50 to 14.00

Malleable Grades:

Industrial	15.50 to 16.00
Railroad	15.50 to 16.00
Agricultural	15.50 to 16.00

Special Grades:

Chemical borings	11.50 to 12.00
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Warehouse Prices, f.o.b. Boston

Base per Lb.

Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.

Per Cent Off List

Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

BOSTON

Business in Pig Iron, Scrap and Cast Iron Pipe Is Rather Limited

BOSTON, July 15.—With the New England melt smaller than in many years, pig iron buying continues at a minimum. Sales the past week totaled less than 2000 tons, of which the Mystic Iron Works sold 1350 tons. Most of the Mystic iron was sold to melters outside New England. With a New York State furnace out of blast and with two Buffalo furnaces banked, the undertone of pig iron prices appears a little firmer despite the lack of demand. On the other hand Buffalo and east of Buffalo No. 2X iron recently was available at \$20.40 a ton delivered and less, and it is claimed round tonnages can be purchased today on the same price basis, on a rail and water freight. India No. 2X iron is available at \$20 to \$20.50 a ton on dock here, duty paid, but imported iron is not much of a market factor today. Importations here the first six months of this year were approximately 6000 tons or at the rate of 12,000 a year, contrasted with 67,000 tons in 1926.

Foundry iron prices per gross ton deliv'd to most New England points:

Buffalo, sil. 1.75 to 2.25	\$20.28 to \$21.28
Buffalo, sil. 2.25 to 2.75	20.78 to 21.78
*Buffalo, sil. 1.75 to 2.25	20.91 to 21.91
*Buffalo, sil. 2.25 to 2.75	21.41 to 22.41
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
*Ala., sil. 1.75 to 2.25	22.61
*Ala., sil. 2.25 to 2.75	23.11
*Ala., sil. 1.75 to 2.25	18.75
*Ala., sil. 2.25 to 2.75	19.25

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Reinforcing Bars.—No important business was placed the past week in either billet steel or rail steel bars. It is understood that 2000 tons for the Boston post office will be placed this week and that at least two 100-ton lots also will be bought. Some low prices have been made on the local post office tonnage. Prices quoted openly on billet steel bars are: One to 5-ton lots, 3.15c. a lb., base, from stock; 6 to 99 tons, 2.65c.; 100 tons and over 2.55c. The market for rail steel bars is 2.26½c. a lb., delivered Boston freight rate points.

Cast Iron Pipe.—Cast iron pipe business has dried up somewhat and prices are decidedly unsettled. The Donaldson Iron Co. was the low American bidder on 600 tons of 6, 8 and 16-in. pipe required by Putnam, Conn. That company's bid was \$41.50 a ton, delivered, or \$36.40 a ton at foundry. French pipe was offered at \$39.65 a ton delivered. No award has been made. New Haven, Conn., has purchased 300 tons of 48-in. pipe from an unnamed foundry, and Hartford, Conn., 385 tons and Wethersfield, Conn., 250 tons from R. D. Wood & Co. On small lots of pipe, 10-in. stock last week sold for Massachusetts delivery at \$40.40 a ton, or about \$35 a ton, foundry, and other sales of 6-in. and larger pipe made at less than \$36

a ton foundry. The market for American pipe is about \$35 to \$36.50 a ton, foundry, for 6-in. and larger. A \$3 differential is openly quoted on Class A and gas pipe, but this is reported to have been shaded. Braintree, Mass., will close bids July 18 on 600 tons of 10-in. pipe.

Coke.—Demand for foundry coke is light. A recent day found the largest seller without a shipping instruction, something never before experienced by the company. Domestic coke sales, on the other hand, far exceed all previous records and the price will be advanced 50c. a ton on Aug. 1. There is no indication that the cost of foundry coke will change then.

Old Material.—The slight improvement in the No. 1 heavy melting steel market noted last week was short-lived. The top price offered for it today is \$9 a ton on cars shipping point, but most brokers will not pay more than \$8.75, an easing of 25c. a ton. No. 1 railroad wrought is quoted 50c. a ton lower, but prices are admittedly tentative. The range of long bundled skeleton prices is rather wide, \$6 to \$6.75 a ton on cars. For Worcester, Mass., delivery \$6.10 on cars is generally quoted. A further cut of 50c. a ton on forge scrap is the result of old orders being filled. Stove plate for Pennsylvania delivery is \$5.10 a ton on cars shipping point. The one New England consumer in the market will not pay more than \$7.75 a ton, delivered. The Boston & Maine Railroad today closes bids on a small list of scrap, 25 cars. A steamer here is loading relaying rails for Yokohama.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$8.75 to \$9.00
Scrap T rails	8.50 to 8.75
Scrap girder rails	7.50 to 7.75
No. 1 railroad wrought	7.00 to 7.50
Machine shop turnings	4.00 to 4.50
Cast iron borings (steel works and rolling mill)	3.75 to 4.25
Bundled skeleton, long	6.00 to 6.75
Forge flashings	7.00 to 7.25
Blast furnace borings and turnings	3.50 to 4.00
Shafting	6.00 to 6.50
Steel car axles	13.00 to 13.50
Wrought pipe, 1 in. in diameter (over 2 ft. long)	7.00 to 7.50
Rails for rolling	9.00 to 9.25
Cast iron borings, chemical	9.00 to 9.25

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$11.50 to \$12.00
No. 1 machinery cast	14.00 to 14.50
No. 2 machinery cast	11.00 to 12.00
Stove plate	7.75 to 9.50
Railroad malleable	16.00 to 16.25

Sales by the Copperweld Steel Co., Rankin, Pa., in the first six months of 1930 were 13 per cent above those of the same period of 1929, while shipments showed a gain of 15 per cent. Power companies, railroads and communication companies were among the buyers.

Non-Ferrous Metal Markets

Copper, Tin and Zinc at New Lows—Lead Steady—Buying Light

NEW YORK, July 15.

Copper.—Copper prices are at the lowest levels since 1921. Whereas a week ago only one or two custom smelters would sell at 11½c. a lb., today all producers are selling freely at that figure. The export price has been reduced ¼c. to 11.80c. c.i.f. European ports, the lowest in the history of Copper Exporters, Inc. Export sales were stimulated somewhat by this reduction. Today they have been 1600 tons. Domestic sales so far this month are estimated at 45,000 tons.

Since the June statistics came out Saturday demand has been more quiet as the figures were regarded as unfavorable since surplus refined stocks increased 8116 tons to 316,762 tons, the largest since September, 1921. Moreover, shipments fell 8170 tons to 116,705 tons, whereas a gain had been expected in May, when record sales for any one month had been made. The trend of production was favorable, however, since refined output declined 7362 tons in the two Americas to 124,821 tons and United States mine output dropped 3773 tons to 56,000 tons. The series of gains in surplus stocks has been unbroken for many months.

Copper buyers now have in mind a price of 11c. a lb. and early this week a deadlock apparently existed, as producers were unwilling to yield further in price. The bulk of the domestic sales of 45,000 tons is said to have been for September shipment and was largely purchasing of a speculative nature rather than for needs on consumers' books. Since the starting of the new refinery at El Paso, Tex., Lake copper has not always sold at the premium of ½c. a lb. over electrolytic copper, but instead at the same figure.

Tin.—Straits tin has dipped to new low price levels since 1922, during which year a bottom figure of 28.75c. a lb. was touched. Over the past week tin sold at 29.12½c. on Tuesday and, though late last week the quotation reacted higher, the trend was downward early this week. Consumer buying of tin is still slack. Stocks of tin in warehouses of the United Kingdom increased 97 tons for the week ended July 12 to the total of 22,365 tons, the largest on record. Stocks in official warehouses of the National Metal Exchange are also high at 4366 tons. Further announce-

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	July 15	July 14	July 12	July 11	July 10	July 9
Lake copper, New York.....	11.62½	11.62½	11.62½	11.62½	11.62½	12.12½
Electrolytic copper, N. Y.*.....	11.25	11.25	11.25	11.25	11.25	11.25
Straits tin, spot, N. Y.....	29.50	29.37½	29.50	29.50	29.12½	29.25
Zinc, East St. Louis.....	4.12½	4.10	4.12½	4.12½	4.07½	4.10
Zinc, New York.....	4.47½	4.45	4.47½	4.47½	4.40	4.45
Lead, St. Louis.....	5.15	5.15	5.15	5.15	5.15	5.15
Lead, New York.....	5.25	5.25	5.25	5.25	5.25	5.25

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

ments have been made, however, pertaining to a widespread curtailment of production during two months of the summer, which if carried out painstakingly, should do much to stiffen the situation. London prices today were £3 to £4 per ton less than a week ago. Standard was quoted at £131 7s. 6d. for spot and £133 for futures, with spot Straits at £132 12s. 6d. In the American market Straits tin sold at 29½c. in the forenoon and 29½c. in the afternoon, with total sales today 200 to 250 tons.

Lead.—Lead prices continue very steady at 5.15c. a lb., East St. Louis, and 5.25c., New York. Prices at London are inclined to advance and reflect a better tone of the market abroad. American lead producers sense an impending improvement here. Lead consumers have done but little purchasing for August shipment and this style of business is expected to materialize on an extensive scale soon. Most of the recent sales have

been of carload lots, for prompt shipment.

Zinc.—Sales of zinc were made in a limited manner and to favored customers at 4.05c. a lb., East St. Louis, late last week, which represents the lowest quotation since 1907. However the official market price at which all consumers could buy did not dip below 4.10c. or possibly 4.07½c. The situation was still dominated by June statistics, which had revealed an increase in surplus stocks of nearly 7000 tons to over 109,000 tons, the largest in history. Demand continues light.

The price of zinc concentrates in the tri-State district continues at \$29 per ton and in the stability of the ore price lies the hope of the entire zinc industry for the next few weeks. Sales of concentrates last week came to 3350 tons, against production of 8900 tons. Shipments were 5921 tons, leaving a surplus of 27,161 tons.

Antimony.—Due to the arrival of

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	18.25c.
Copper, hot rolled, base sizes.....	21.25c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	23.50c.
Seamless Tubes—	
Brass	23.25c.
Copper	23.25c.
Brass Rods	16.50c.
Brazed Brass Tubes.....	25.75c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	32.00c. to 33.00c.
Tin, bar	34.00c. to 35.00c.
Copper, Lake	13.25c.
Copper, electrolytic	13.00c.
Copper, casting	12.75c.
Zinc, slab	6.25c. to 7.25c.
Lead, American pig.....	6.25c. to 6.75c.
Lead, bar	8.25c. to 8.75c.
Antimony, Asiatic.....	9.75c. to 10.25c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloys	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ⅓.....	22.25c. to 23.25c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	35.00c.
Tin, bar	37.00c.
Copper, Lake	13.13c.
Copper, electrolytic	13.13c.
Copper, casting	12.75c.
Zinc, slab	6.25c. to 6.50c.
Lead, American pig.....	6.00c. to 6.25c.
Lead, bar	8.75c.
Antimony, Asiatic	14.00c.
Babbitt metal, medium grade	17.50c.
Babbitt metal, high grade	38.00c.
Solder, ½ and ⅓	22.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	9.50c. 10.50c.
Copper, hvy. and wire	9.25c. 10.25c.
Copper, light and bot-toms	8.00c. 9.00c.
Brass, heavy	5.50c. 6.50c.
Brass, light	4.50c. 5.75c.
Hvv. machine compo-sition	8.00c. 9.00c.
No. 1 yel. brass turn-ings	5.50c. 6.50c.
No. 1 red brass or compos. turnings	7.25c. 8.25c.
Lead, heavy	3.75c. 4.25c.
Lead, tea	2.50c. 3.25c.
Zinc	2.00c. 2.50c.
Sheet aluminum	7.50c. 9.50c.
Cast aluminum	7.00c. 9.00c.

unsold stocks of antimony recently the price declined $\frac{1}{4}$ c. a lb. from levels long prevailing to 6.75c., duty paid. This week, however, the market is a bit firmer with 6.85c. the usual quotation.

Nickel.—The market continues the most stable of all the metals. Ingots in wholesale lots sell at 35c. a lb., spot selling at 36c. and electrolytic nickel in cathodes, at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is steady at the recently reduced price of 22.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, July 15.—Copper and antimony prices dropped the past

week but the decline in copper failed to stimulate buying except in a few isolated cases. Despite the downward revision of almost all old metal items the market remains listless.

Prices per lb., in carload lots: Lake copper, 11.75c.; tin, 30c.; lead 5.25c.; zinc, 4.25c.; in less-than-carload lots, antimony, 8c. On old metals we quote copper wire, crucible shapes and copper clips, 9c.; copper bottoms, 7.25c. to 7.75c.; red brass, 7.25c. to 7.75c.; yellow brass, 5c. to 5.50c.; lead pipe, 3.75c.; zinc, 1.50c. to 1.75c.; pewter, No. 1, 15c.; tin-foil, 17.50c.; block tin, 22.50c.; aluminum, 7c. to 7.50c.; all being dealers' prices for less-than-carload lots.

SACRAMENTO, 134 tons, State bridge over Klamath River, to an unnamed bidder. VANCOUVER, B. C., 100 tons, sewer project, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEWTOWN, CONN., 250 tons, hospital. SPRINGFIELD, MASS., 200 tons, hospital. STATE OF MASSACHUSETTS, 150 tons, State highway bridges.

NEW YORK, 1285 tons, Fort Lee bridge; 300 tons of bars and 225 tons of joists for main approach ramp, and 700 tons of bars and 60 tons of mesh for vehicular tunnel; Cornell Contracting Corporation, New York, low bidder on general contract.

NEW YORK, 150 tons, subway route 103, section 3; Hart & Early, Inc., New York, general contractor.

NEW YORK, 800 tons, subway route 108, section 8, in Queens; Slattery Daino Co., Inc., New York, low bidder on general contract.

MAMARONECK, N. Y., 260 tons, sewage disposal plant, Westchester County Sanitary Commission; general contract awarded to Woodcrest Construction Co., New York.

JAMAICA, N. Y., 300 tons, warehouse for Montgomery Ward & Co., Chicago.

TUCSON, ARIZ., 277 tons, Broadway sub-way; bids Aug. 4.

LOS ANGELES, 200 tons, warehouse for Crescent Wharf & Warehouse Co.; bids being taken.

LOS ANGELES, 100 tons, apartment building, 939 South Serrano Avenue; bids being taken.

SACRAMENTO, 100 tons, State bridge over Trinity River; bids opened.

REDWOOD CITY, CAL., 100 tons, hospital; bids opened.

YUBA CITY, CAL., 275 tons, highway work; bids opened.

Reinforcing Steel

Week Has Been Quiet—Awards Total 5400 Tons

AWARDS of reinforcing steel the past week, at 5400 tons, included none of large size and compare with 4000 tons a week ago. New inquiries were again light and in small lots, amounting to 1850 tons. Awards follow:

STATEN ISLAND, N. Y., 600 tons, oil terminal improvements, Gulf Refining Co.; placed by Raymond Concrete Pile Co. with Concrete Steel Co.

STATEN ISLAND, N. Y., 200 tons, oil terminal improvements, Gulf Refining Co.; placed by United Engineers & Constructors with E. T. Edwards.

SOMERVILLE, N. J., 200 tons, grade crossing elimination for Lehigh Valley Railroad, to Concrete Steel Co.

PHILADELPHIA, unstated tonnage, by-product coke ovens for Philadelphia Coke Co.; from Rust Engineering Co., general contractor, to Truscon Steel Co.

PHILADELPHIA, 1200 tons, administration building for Philadelphia school district, to Concrete Steel Co.

CLEVELAND, 300 tons, school administration building, to Republic Steel Corporation.

NEW ORLEANS, 550 tons, United States Marine Hospital, to Connors Steel Co.

STATE OF ILLINOIS, 530 tons, highway work, to Concrete Engineering Co.

MINNEAPOLIS, MINN., 500 tons, grain elevator, to Inland Steel Co.

SEATTLE, 500 tons, Aurora Avenue bridge, to Columbia Steel Co.

VALE, ORE., 124 tons, Bully Creek and Fairman Coulee siphons, to an unnamed bidder.

SACRAMENTO, 438 tons, highway work in San Mateo County, to an unnamed bidder.

Screening and Sizing Plant for Coke

A NEW coke screening and sizing plant, designed and built by the Semet-Solvay Engineering Corporation, New York, has been placed in service by the Sloss-Sheffield Steel & Iron Co., Birmingham. The plant embodies the latest developments in the preparation of coke. A most convenient arrangement for operation has been incorporated in

the assembly of conveyors, screens, crusher, loading, electrical system and track layout. Coke for industrial and domestic uses, from the largest sizes to breeze, can be loaded rapidly. Six cars can be filled simultaneously with various grades of coke. Materials produced in the South entered largely into the construction of this plant



Fabricated Structural Steel

Awards of 58,000 Tons, Largest of Year, Include Subway Bridge and Oil Tanks—New Projects 22,000 Tons

AWARDS of structural steel totaling in excess of 58,000 tons were the largest of any week this year, surpassing the previous high mark of 53,000 tons in the final week of January. Included in the total were 14,800 tons for New York subway work, 9500 tons for tanks for the Gulf Refining Co. in Pittsburgh, Baltimore and New York, 7500 tons for a bridge in Seattle, Wash., and a total of 6900 tons in two office buildings in New York.

New projects of 22,000 tons were larger than in the two previous weeks and included a telephone building in New York, 13,000 tons, which was previously reported as requiring only 4000 tons, and 6500 tons for an apartment building on Central Park West, New York.

North Atlantic States

BOSTON, 1380 tons, Western Union Building, to New England Structural Co.
FRAMINGHAM, MASS., 190 tons, bank, store and office building, to an unnamed fabricator.
EVERETT, MASS., 134 tons, contact house, Merrimac Chemical Co., to New England Structural Co.
MERIDEN, CONN., 100 tons, bridge, to American Bridge Co.
NEW YORK, 14,800 tons, subway route 108, section 8, to American Bridge Co.
NEW YORK, 3400 tons, office building at John and Pearl Streets, to Hedden Iron Construction Co.
NEW YORK, 3500 tons, office building at Fortieth Street and Madison Avenue, to Taylor-Fichter Steel Construction.
JERSEY CITY, N. J., 2200 tons, Pier D for Terminal Development Co. and Pennsylvania Railroad, to McClintic-Marshall Co.
ASTORIA, N. Y., 975 tons, Loew Theater building, to Bethlehem Fabricators, Inc., previously reported to an unnamed bidder.
STATE OF NEW YORK, 190 tons, highway bridge in Syracuse, to Bethlehem Steel Co.
TARRYTOWN, N. Y., 500 tons, building for Chevrolet Motor Co., to an unnamed fabricator.
PENNSYLVANIA RAILROAD, 160 tons, beams for Spring Garden tunnel, to McClintic-Marshall Co.
PHILADELPHIA, 2205 tons, administration building for Philadelphia school district, to Bethlehem Steel Co.
BALTIMORE & OHIO RAILROAD, 110 tons, highway bridge at Gaithersburg, Md., to Bethlehem Steel Co.
BALTIMORE, 165 tons, building for Commercial Pigment Co., to Bethlehem Steel Co.
PHILADELPHIA, 600 tons, two bridges on B Street for City of Philadelphia and Pennsylvania Railroad, to McClintic-Marshall Co.
WASHINGTON, 2300 tons, United States Department of Agriculture Building, reported awarded to American Bridge Co.
AMBRIDGE, PA., 250 tons, two water tanks for Borough of Ambridge, to Pittsburgh-Des Moines Steel Co.
MONACA, PA., 250 tons, addition to St. Joseph Lead Co. plant, to Pittsburgh Bridge & Iron Works.
PITTSBURGH, 9500 tons, plate, tank work at Pittsburgh, Baltimore and Staten Island, N. Y., for Gulf Refining Co., to McClintic-Marshall Co.

The South

RICHMOND, VA., 850 tons, Federal Reserve Bank building, to American Bridge Co.
D'ARMANDVILLE, ALA., 150 tons, natural gas compressor station, to Ingalls Iron Works.

Central States

BERTRAND, MICH., 400 tons, State highway bridge, to McClintic-Marshall Co.
CINCINNATI, 420 tons, freight terminal for Baltimore & Ohio Railroad, to American Bridge Co.

CLEVELAND, 1250 tons, administration building for Board of Education, to Massillon Bridge & Structural Co.
CHICAGO, 2500 tons, World's Fair building, to American Bridge Co.; previously reported to an unnamed bidder.
CHICAGO, 2200 tons, north approach to Wabash Avenue bridge, to American Bridge Co.

STATE OF ILLINOIS, 1200 tons, highway bridges, to Vincennes Bridge Co. and Continental Bridge Co.

Western States

COLLINSVILLE, OKLA., 700 tons, bridge, to Illinois Steel Bridge Co.
LOS ANGELES, 150 tons, plates, storage tank for Pacific Molasses Co., to Lacy Mfg. Co.

EUREKA, CAL., 598 tons, plates, 42 and 52-in. welded steel pipe for Salyer Consolidated Mining Co., to Western Pipe & Steel Co.

VALE, ORE., 2027 tons, plates, Bully Creek and Fairman Coulee siphons, to Western Pipe & Steel Co.

SEATTLE, 7500 tons, Aurora Avenue bridge, to Columbia Steel Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

DUDLEY, MASS., 175 tons, State highway bridge.
BARRE, MASS., 105 tons, intake, for State Water Commission.
WEST BOYLSTON, MASS., 102 tons, outlet, for State Water Commission.
NEW YORK, 6500 tons, Majestic Apartments, Seventy-first to Seventy-second Streets on Central Park West.
NEW YORK, 13,000 tons, telephone building at Walker and Lispenard Streets; previously reported as 4000 tons.
NEW YORK, 300 tons, executive building, prison and garage for Sixteenth Police Precinct; Robert J. Murphy, New York, low bidder for general contract.
NEW YORK, 600 tons, addition to Sage Foundation, East Twenty-second Street.
BROOKLYN, N. Y., 7800 tons technical high school; Fredburn Construction Co., New York, low bidder for general contract.
STATE OF NEW YORK, 1100 tons, highway bridges; bids open July 22.
NEWARK, N. J., 1500 tons, telephone building.
BOUND BROOK, N. J., 1750 tons, plant for Bakelite Corporation; previously reported as 500 tons.
BUFFALO, 600 tons, Buffalo Market Terminal Co. building.
COPELEY, PA., 900 tons, bridge for Lehigh and Northampton counties; former bids rejected.

Central States

BATTLE CREEK, MICH., 1300 tons, Central Bank building.
CHICAGO, 5000 tons, Lane Technical High School; new bids due July 22.
CHICAGO, 4600 tons, apartment building.
CHICAGO, 800 tons, theater.
DES MOINES, IOWA, 700 tons, warehouse for Grocers Wholesale Co.
STILLWATER, MINN., 900 tons, St. Croix bridge.

Western States

WICHITA, KAN., 1000 tons, Roosevelt Hotel; new bids called.
LOS ANGELES, 100 tons, plates, four tanks for General Terminal Corporation; bids being taken.
LOS ANGELES, 1800 tons, State building; bids Aug. 5.

Railroad Equipment

Orders for 425 Cars and Two Locomotives—Inquiries for 325 Freight Cars

ORDERS for cars showed a slight increase over previous weeks with a total of 425 bought, including 250 for the Gulf Refining Co. and 154, which the Fruit Growers Express will build in its own shops. New inquiries for 325 cars include 300 steel underframe box cars and five caboose cars for the Lehigh & New England. In the locomotive field there were two purchases, a switching engine by the Aluminum Co. of America and a 60-ton electric freight locomotive by the Salt Lake & Utah Railroad Co.

Lehigh & New England is inquiring for 300 50-ton steel underframe box cars and five steel underframe caboose cars.

Western Fruit Express Co. has put out an inquiry for an additional 100 underframes for refrigerator cars, and will build 12 refrigerator cars in its own shops.

Detroit Edison Co. has ordered five hopper cars from American Car & Foundry Co.

United States Navy has placed two flat cars and two box cars with American Car & Foundry Co.

Fruit Growers Express will build 154 refrigerator cars in its own shops.

Union Pacific is inquiring for 10 baggage, one baggage-postal and 14 passenger-chair cars.

Erie is in the market for seven through-line coaches and two mail-express cars.

Maine Central is inquiring for five de luxe coaches and two passenger-baggage cars.

Aluminum Co. of America has ordered one switching locomotive from Baldwin Locomotive Works.

Salt Lake & Utah has ordered one 60-ton electric freight locomotive from Baldwin Locomotive Works and Westinghouse Electric & Mfg. Co.

Solvay Process Co. is inquiring for 10 air dump cars.

Youngstown Sheet & Tube Co. is inquiring for 10 flat cars.

Missouri-Kansas-Texas is planning to build 25 caboose cars in its own shops.

Gulf Refining Co. has ordered 125 tank cars from General American Tank Car Corporation and 125 from Petroleum Iron Works.

The New Diesel Aircraft Engine

(Continued from page 151)

effect. Thus the stresses in the crankshaft are greatly reduced and it is possible to use a crankshaft of a size not substantially different from that employed in a corresponding gasoline engine. This feature of the design contributes considerably to the weight reduction as compared with previously built Diesels, which have all been characterized by extremely heavy crankshafts.

"The counterweights, instead of being rigidly bolted to the crank cheeks, are pivoted on them and are located between powerful compression springs. With this arrangement, when the crankshaft is suddenly accelerated, the counterweights lag behind slightly, so that the peak cylinder-pressure is expended before the counterweights are again solidly driven by the crank-shaft.

"Similarly, the propeller hub, instead of being splined or keyed to the crankshaft, is allowed to float on an extension of the crankshaft driving-end, and specially designed propeller-blade clamp-rings provided with integral driving-lugs receive the driving effort from a two-armed driving member splined to the crankshaft. Compressed on the extremity of each of these two arms are a pair of rubber blocks between which the propeller clamp-ring driving-lug is secured. These rubber blocks are confined in such a manner as to yield the desired elasticity. Here again a marked weight-saving is accomplished, since the propeller hub can be made of very light construction because it is completely cushioned from any driving shocks. While the elastic connection of the propeller to the crank-shaft might in itself aggravate torsional vibration, the inherent damping or hysteresis of the rubber blocks, supplemented by the surface friction in the counter-weight mounting, quickly and entirely smooths out the shaft rotation."

It is also evident that the same careful regard for weight reduction has obtained in the design of the cylinders. They weigh only $11\frac{3}{4}$ lb. each. The cylinder head is integral with the cylinder barrel, the single valve arrangement and the easy cooling making for great simplicity. The thermal efficiency of the Diesel principle is another point in its favor. There are lower heat losses and the valve operates at a lower temperature, the incoming air cooling the valve between exhausts.

To increase the turbulence and secure complete and efficient combustion, the incoming air is given a high velocity spiral motion by the shaping of the inlet port as a flattened venturi tube arranged tangentially to the cylinder bore. A valve of large diameter assures full volume of air in the cylinder.

Combination Fuel Pump and Nozzle an Important Unit

According to Captain Woolson, the feature that probably contributes most to the successful operation of the engine is the combination of fuel pump and nozzle unit:

"Heretofore the majority of solid-fuel-injection engines of the so-called high-speed type (maximum revolutions about 1200 r.p.m.) have been characterized by a multi-pump unit mounted somewhere on the engine

remote from the cylinder-heads in which the nozzles are located and connected to them by comparatively long capillary tubing. With such a system satisfactory high-speed operation is very difficult to obtain, for several reasons, the principal one being that enormous hydraulic pressures necessary for high-speed operation cause serious surges of pressure waves in the tubing which interfere with the correct timing of the fuel injection, and also tend to make the engine run unevenly, since it is difficult to arrange the tubing to the various cylinders so that all of the tubes are of the same length. Another difficulty arises from the trapping of air in the capillary tubing, which air is difficult to expel and causes the engine to misfire. All of these troubles have been overcome with the fuel-injection system of the new engine, since the pump and nozzle are practically one unit, with extremely short connecting passages between them.

"A great deal of care has been given to the design of the moving parts of the fuel-injection system to reduce their inertia to the minimum, since at high speed extremely high accelerations in the order of 15,000 ft. per sec. per sec. are encountered."

Crankshaft of Conventional Split Type

Made of a one-piece magnesium-alloy casting, the crankcase carries a deep-groove ball-bearing designed to take the radial load and propeller thrust. The crank-shaft is of the conventional split type. The rear half is attached to the front by a clamp bolt and key engaging the crankpin. The rear crankshaft-bearing supported in a removable diaphragm wall is also of the roller-bearing type. The covered casting which forms the rear of the crankcase carries the oil and fuel-circulating pumps, the starter, the generator, and tachometer drive. As will be seen by the illustration, the master connecting rod, with eight links, follows current practice. The pistons are made of aluminum-alloy and have a special shaped head carrying an eccentrically located pocket, which assists in producing a high degree of turbulence which is necessary for the efficient operation at high speed of this engine. There are two compression rings at the outer end and an oil scraper ring below. The piston-pins float in both the piston bosses and connecting-rod small-end bearings. Aluminum plugs expanded into each side provide rubbing surfaces in contact with cylinder-walls.

There are nine each of valve and fuel-pump push-rods, radially arranged at the rear of the engine operated by two cams which are formed integrally and each of which is provided with four lobes. These cams are driven at one-eighth the engine in a direction opposite to the crankshaft rotation. The single valve and fuel-pumps of each cylinder are actuated by rocker-arms, the pair of rocker-arms for each cylinder being located endwise between an integral shoulder on the shaft at the inner end and a shouldered bushing held in place by a cap-screw at the outer end. The lubricating-oil pump is driven by a spur gear off the cam idler-gear. The valve-operating mechanism consists of a ball-end push-rod engaging a rocker-arm mounted on a roller-bearing which oscillates on an eccentrically arranged shaft. Each valve is fitted with 12 valve-springs of the multiple type, the purpose of this multiple valve-spring arrangement being not only to assure the greatest possible security from the failure

of the individual valve-springs, but also to eliminate as far as possible the possibility of failure. Furthermore, it is believed that the small size of spring wire used has superior physical properties as compared with larger sizes.

Fuel Pump and Nozzle Assembly Detachable

The fuel-pump and nozzle assembly is so designed as to be readily detachable and entirely interchangeable. The fuel-pump body is an alloy-steel forging fitted with a bronze cylinder pressed in place. The pump plunger is heat-treated steel provided with a mushroom head which engages a T-slot in a cross-head guide which in turn contacts with the fuel-pump cavity. The compression spring, which returns the pump plunger, surrounds the pump cylinder. The nozzle body is also an alloy-steel forging screwed to the pump body. The joint between the two is lapped.

The lubrication system offers little that is unconventional. There are no oil pipes inside the engine nor any drilled passages in the crankcase itself. Operating on the dry-sump principle, the system is simple and efficient.

Domestic Fuel Oil Used for Diesel Aircraft Engine

Much curiosity was expressed before the engine was shown as to how the powerplant was started. Captain Woolson said that a number of experiments were made on several types of starting devices; the ordinary field starters, those of the compressed-air type, and a cartridge type using 12-gage shot-gun shells. The inertia starter, however, commonly used in airplane practice was finally selected and seems to give

good results. The Diesel engine requires no priming nor choking and is cranked with a wide open throttle. In very cold weather, it is essential that glow-plugs be used, but with their use there is no difference in starting even at zero or below.

The engine may be stopped merely by closing the throttle completely. There are no switches to operate. It is not necessary to shut off the fuel, nor is there any danger of the engine kicking backward. Ordinary domestic furnace oil costing now about 9c. a gallon, having a specific gravity of 0.84 has been used satisfactorily in this type of Diesel engine. And it is said that many kinds of fuel will operate it successfully.

"It has been prophesied frequently," said Captain Woolson, "that Diesel aircraft engines would not be able to operate at great altitudes without using some form of pre-heater or super-charger or both, but experiments with the Packard Diesel proves such theories to be entirely wrong."

A number of planes equipped with this engine have climbed more than 18,000 ft. without special equipment of any kind, the engine functioning in a normal manner. Furthermore, pilots have found that they are not required to make continual adjustments in the fuel supply for varying altitudes as is the case with the common gasoline engine. The engine has a reliability and economy of operation, a reduction of fuel consumption and fuel costs which are worth studying. The Diesel is not affected by abnormally high or low air temperatures and, furthermore, because in its design there has been a total elimination of an electrical ignition system, there is no need for shielding for the elimination of radio interference.

Line Production the Keynote

(Concluded from page 155)

section, which mounts the tappets and thrust bearing, is set over them and the ignition wire harness is attached. By the time the assembly stand reaches the central aisle, the major parts are assembled, the minor parts being assembled after the stand crosses the aisle.

Assembled Engine Tested and Then Torn Down for Inspection

The pistons heavily oiled, with the rings, are slipped on to the connecting rods. The cylinders, which have had valves, rockers, springs, etc., mounted and adjusted as part of the cylinder finishing operation, are next pushed over and bolted on. When No. 1 cylinder, the first to go on, is in place, the engine is timed. Next the push rods, their cover tubes, the intake pipes, oil pump, mixture heater, and carburetor are attached. With the exception of checking the valve clearances and snapping on the rocker box covers, the engine is now assembled. This completed, the engine on the assembly stand is weighed and then rolled to the belting-in-machines, where the oil lines are connected, and the engine is run for a period.

The engine next passes to the test houses at the rear of the plant where it is put through a thorough manufacturer's test, at gradually increasing throttle, after which it is brought back to the disassembly de-

partment adjacent to the assembly department where it is completely torn down for a thorough inspection of all parts. At this point any parts showing imperfections of any nature are eliminated. After reassembly, the engine is again passed to the test house for the final test, one-half hour of which is at 9/10 load and one-half hour at rated load.

From the test house, the engine passes through spray booths where the outside is cleaned with a special mixture; it then passes to the packing and shipping department where tracks enter the building.

The machines in the shop are of the most modern type, each selected for the most efficient production of the various parts. Individual motor drive is the rule. It is felt that, in addition to giving the entire plant a clear overhead appearance, the individual motor drives eliminate delays, for with this drive, for example, when a fuse blows out but one machine is affected. Compressed-air lines run throughout the shop from which air can be supplied at any point desired. Materials are moved by electric trucks, by hand trucks, and by tractor-pulled trucks.

Plant Additions Can Be Made Without Interrupting Production

Power is supplied by the Hartford Electric Light & Power Co. from a station located just across the Connecticut River. Equipment in the plant power house includes transformers, and two 750-hp. water-tube boilers (heated by oil burners) which furnish

process steam at 165-lb. pressure for various washing purposes. There are also two 3200-c.f.m. forced-draft fans to aid the boiler combustion, and two 500-c.f.m. air compressors that furnish compressed air to the factory. The factory is heated by two hot-water heaters, each with a capacity of 3000 gal. per hr.

In laying out this plant the Pratt & Whitney Aircraft Co. took into consideration the possibility of expansion without interfering with factory produc-

tion. It set aside 400 ft. of land on the north side of the plant and 400 ft. on the south side of the plant which is equivalent to 20 standard bays. In view of the fact that all of the bays are standard, construction work on an expansion program could be started immediately.

The author is indebted to C. L. Burns, assistant to Vice-president Brown in charge of manufacturing, for information incorporated in the foregoing account.

Book Reviews

(Continued from page 169)

but as more stories are added more space must be taken for elevator openings and the ratio of total gross to net rentable area increases. Column steel, the second item, rises more rapidly. Additional stories increase the weight of lower column sections and grillages. It is readily seen that steel *erection* becomes more expensive in a tall building as derricks and plant become more expensive and more time is taken to reach the upper levels, both for men and material. *Windbracing* also increases in cost with the height of a building.

Aside from increase in height the weight of steel per cubic foot of volume is increased by irregular shaped plots, by setback walls carried on girders, by columns spaced to meet subdivision of floors and by architectural requirements. The buildings under review are ideal throughout. They have been designed to avoid irregular spacing of columns, and setback walls are carried on column lines. This is not always practicable but it can be done to a larger extent than at present if architects give more consideration to the steel construction.

The estimated weights per cubic foot of volume given in the book have been made with unusual care but they should not be taken as the weight of a proposed structure unless all the conditions that govern the one are found in the other. For the average tall building an individual study must be made. The unit weight will be increased over that of the ideal building.

ROBINS FLEMING.

Standards and Standardization

Industrial Standardization. By Norman F. Harriman. 306 pages, 6 x 9 in., illustrated. National Industrial Conference Board, New York. Price \$3.50.

The introduction by M. S. M. Vauclain, which suggests that "the subject is so full of future promise that the book is its own best review," seems to make the present reviewer's task somewhat supererogatory, but a brief appreciation may serve to guide to the book readers who are interested in the subject.

Mr. Harriman reviews briefly the rise of the industrial age and shows that the adoption of standards was a necessary accompaniment and an essential. An excellent point is made in the statement that "standardization is a useful servant but a bad master." If properly used standardization facilitates the production necessary to progress, but improperly used in a rigid uncompromising way it will hold up development.

An interesting account is given of the basic standards of measurement of length, mass, time, temperature, and electric units maintained by the Bureau of Standards at Washington. Following this introduction, standardization and its uses in industry are considered. It is pointed out that the advantages of standardization in reducing industrial costs are important to both manufacturer and con-

sumer. It tends to eliminate waste and to promote efficient use of labor and material. With modern production methods there is a progressively increasing resort to standardization of products and processes. Machinery is only completely effective when used to make a standardized product. This thesis is developed and illustrations are given. At the same time the danger of over-standardization, leading to stagnation of progress, is pointed out.

A brief account is given of the constitution and of the work of the most important standardizing bodies throughout the world. The procedure of these is largely based on the method of cooperation developed by the British, which has come to be known as "Sectional Committee" procedure. The formulation of specifications and committees made up of representatives of the various bodies concerned. As a matter of principle the sectional bodies do not initiate work, but await suggestions from those interested.

An account is given of official laboratories in this country and Europe engaged in standardization work and Mr. Harriman concludes with a chapter on Trend of Standardization and an Appendix dealing with the work of the Federal Specifications Board in the standardization and coordination of government purchases. The importance of this work may be gauged from the facts that the Government buys from \$250,000,000 to \$300,000,000 of goods in a year and that before the inauguration of the Federal Specifications Board there were in the Treasury Department 26 uncoordinated purchasing agencies, in the Department of Agriculture 18, and so on. Mr. Harriman assures us that it is not the kind of board which can be described as "long, narrow, wooden and usually warped."

As a whole, this book deals with the outstanding features of a vast and important subject in an interesting and readable manner.

LAWFORD H. FRY.

Iron and Steel Works Directory of the United States and Canada. Published by American Iron and Steel Institute, 75 West Street, New York; 464 pages. Price \$15.

Another edition of the compendium of the iron and steel industry—the first in four years—has been issued. This has long been awaited, owing in large part to the great number of changes which have been taking place within the industry in the form of consolidations, expansions, new equipment and enlargement of existing equipment.

This is the twenty-first edition of a work which was initiated by the erstwhile American Iron and Steel Association. It is in the same alphabetical form as the directories of 1926, 1920 and 1916. To give effect to some of the advantages in the previous arrangement, supplementary lists are given of blast furnaces, steel works, steel casting plants and rolling mills, arranged by States and localities.

All companies, firms and individuals engaged in man-

ufacturing pig iron, ferroalloys and kindred products, steel ingots, steel castings, hot-rolled iron and steel products, charcoal blooms and tin plate and terne plate are listed. The information covers not only the company title and location, together with the names of principal officials, but also the location and extent of equipment of various types used in manufacturing the product, the character of product and capacity with which the company is provided, and the location of the principal warehouses, if any, through which the company's products are passed. Sales offices, corporate form and amounts of capital stock, etc., round out the picture.

The alphabetical list covers 392 pages. Following that list appear the brief citations showing geographical location of various types of plants, and a still more condensed list of the manufacturers of particular types of rolled products is given, in some profusion. There is no index, inasmuch as the entire work is on the alphabetical basis—aside from the special pages in the rear of the book—and cross-indexing is carried in the alphabetical order, to cover cases where firm names have been changed.

This publication will continue to be the Bible of the steel industry until the next edition appears.

Year Book of Metal Statistics

Non-ferrous metals are covered in great detail, both as to production and price as well as exports and imports, in the tenth annual issue of the year book of the American Bureau of Metal Statistics. This covers the operations for 1929, with comparative figures for a series of preceding years. It forms a valuable compendium, largely in tabular form, of these various materials, not only for the United States, but for most of the producing countries of the various products. Copies of this book may be obtained from the bureau at 33 Rector Street, New York, at \$2.

World production of copper, based on almost complete reports from producing countries, shows for 1929 an increase of about 10 per cent over the highest preceding year. Of the total the United States accounted for about 49 per cent. Consumption of copper in the United States is allocated to a large number of users, of which electric manufactures are in leading position, with telephone and telegraph, automobiles and light and power lines following in that order.

Lead shows also a new high record for the world, with a gain of 4½ per cent over the previous record. The United States produces about 35 per cent of the total. Largest among the American users of lead are for storage batteries and for covering of cables.

Zinc shows a high record in world production, with an increase of 3½ per cent over the preceding record. Here the United States accounted for 39 per cent of the production. Nearly half the American consumption was for galvanizing and about half of the remainder for brass manufacture.

Other metals covered in the book, in considerable detail, include gold and silver, followed by general tables for platinum, antimony, arsenic, cadmium, nickel, tin, aluminum and brass. Gold production of the United States was only 10½ per cent of the world production—the smallest ratio in many years and only half as great as in 1914 and 1915. American silver production was 23 per cent of the world output. This, with the exception of the preceding year, was the lowest percentage in a good many years.

Tin production of the world made a new high record, about 7 per cent above the preceding maximum. Very little of this was produced in the United States, but our consumption of tin represented about 47 per cent of the

world output. Aluminum made a new high record, 9 per cent above the best previous. The United States accounted for 39 per cent of the total.

New Books Received

Plant Location. By W. Gerald Holmes. 275 pages, 6 x 9½ in., illustrated. McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price \$3.

Applied Mechanics. By Frederic N. Weaver. 322 pages, 6 x 8½ in., illustrated. McGraw-Hill Book Co., New York. Price \$3.25.

Life Expectancy of Physical Property. By Edwin B. Kurtz. 205 pages, 6 x 8½ in., illustrated. Ronald Press Co., 15 East Twenty-sixth Street, New York. Price \$6.

Cost of Living in the United States, 1914-1929. 190 pages, 6 x 9½ in., illustrated. National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price \$2.50.

Systems of Wage Payment. 131 pages, 6 x 9½ in. National Industrial Conference Board, New York. Price \$2.

Grundlagen des Verzinkens. By H. Bablik. 255 pages, 6½ x 9¾ in., illustrated. Julius Springer, Linkstrasse, 23-24, Berlin W 9, Germany. Price 29.5 m.

Eisenguss in Dauerformen. By Friedrich Janssen. 92 pages, 6½ x 9¾ in., illustrated. Julius Springer, Berlin, Germany. Price 10.5 m.

German-English Technical and Scientific Dictionary. By A. Webel. 887 pages, 7 x 10½ in. E. P. Dutton & Co., Inc., 286 Fourth Avenue, New York. Price \$10.50.

The Technique of Executive Control. Third edition. By Erwin Haskell Schell. 171 pages, 5 x 7½ in. McGraw-Hill Book Co., New York. Price \$2.

Journal of the Institute of Metals—1929. 846 pages, 5½ x 8¾ in., illustrated. Published by the Institute, 36 Victoria Street, London, S. W. 1, England.

A new edition of the United States Custom House Guide has been issued by Custom House Guide, Custom House, New York, and may be had for \$5. This has been published yearly since 1862 and the present edition comprises 1325 pages. It contains among other things the new Tariff Act, complete, together with a copyrighted special index of over 20,000 articles covered in that act, arranged alphabetically.

Foreman Must Know His Men

(Concluded from page 144)

get his work out properly and on time. His living tools are far more important to successful manufacturing and will yield greater returns for the effort expended. One never knows what a man can do until one gets him in the right frame of mind. The foreman must plan for his men, prepare the next job for them, smooth out the rough spots. No one expects a lathe to run if the drive belt is broken.

A foreman is only as strong and successful as the atmosphere with which he surrounds himself. His job may be difficult, his men poorly trained, his tools obsolete, but he will obtain one kind of work through wise and thoughtful direction, and another brand if he handles his department in a careless manner.

The foreman is the top sergeant of his company. He must set the example, lead the way by word and deed and fight for and with his men. In no other way can he build up respect for his leadership and regard for the company's welfare. He must obey orders and see that his own are obeyed, and he must do it in a way that will make his men realize he is playing fairly and squarely with them.

British Steel Mills Suspending

Two Plants Dismiss 3500 Workmen As Steel Output Continues to Decline—Free Empire Trade and Safeguarding Discussed

(By Cable)

LONDON, ENGLAND, JULY 14

STRONG opposition is expected to last week's manifesto of certain banking directors urging economy in the national administration, based upon the belief that national prosperity will be restored by easing the burden of taxation rather than increasing taxation by tariffs. Industrial opinion prevails that the original statement was issued because the banks are so heavily involved in loans to British steel works that they consider safeguarding as the only possible means of recovering their money.

An upward movement in iron and steel companies' shares is attributed to the Stock Exchange belief that safeguarding is near at hand and the worst of the depression is over, but there is nothing in the actual industrial situation or outlook to justify such optimism.

Production of iron and steel is declining further and more works are suspending. The Cleveland situation is worse and Gjers, Mills & Co. have blown out the Ayresome furnaces so that today only two stacks are in blast on East Coast hematite and stocks are heavy. Dorman, Long & Co. is closing its Clarence works, dismissing 2000 men, and the Dowlais works, which was absorbed by the merger of Guest, Keen & Nettlefolds, and Baldwin's, Ltd., has also suspended, dismissing 1500 men.

The Dowlais works directors are complaining at Continental and Indian pig iron imports. Incidentally, if the movement for "Empire free trade" should be successful imports

British Iron and Steel Output Continues Decline and Two Mills Suspend, Dismissing 3500 Workmen.

* * *

Soviet Union Buys 120,000 Tons of Steel in Poland.

* * *

Increased Austrian and Japanese Supplies of Molybdenum May Curtail American Exports to Europe.

* * *

German Rivet Makers Plan Mergers and Modernization to Offset Wider Use of Welding.

of Indian iron would be encouraged.

The Central Pig Iron Producers Association has reduced Midland pig iron prices 2s. 6d. (61c.) per ton to meet foreign competition. Finished steel is dull and mills are badly in need of orders, especially for export.

United Kingdom exports of pig iron in June were 19,000 tons, of which the United States was sent 700 tons. Total iron and steel exports were 250,000 tons.

The Continental steel market is disorganized as a result of abandonment by the Continental Steel Cartel

of fixed prices for all materials previously controlled except semi-finished steel, wire rods and beams. The semi-finished syndicates are expected to be established at the meeting this week. Meanwhile, mild steel bars have declined to £4 15s. per ton (1.03c. per lb.) and still lower prices are expected. The present low market was caused by dissatisfaction of mills, which have been adhering fully to agreements and losing orders to other works.

The position of British merchants under the selling syndicates is still uncertain as the plan for a division into classes is now believed to have been abandoned.

Tin plate is generally quiet, but prices are being maintained with mill order books well filled. Certain canning consumers having underestimated their crop requirements are now encountering difficulty in obtaining prompt shipment of tin plate and have been unable to obtain guaranteed August delivery.

Welsh sheet bar prices are maintained, but, in view of a probable reduction in foreign sheet bar prices, it is possible that Welsh steel makers may attempt to meet the competition.

Galvanized sheets are inactive, but prices are maintained. June galvanized sheet exports of 30,000 tons were the worst in almost nine years. Black sheets are quiet.

The Government is sending a trade delegation to South Africa under the chairmanship of Lord Kirkley, a former president of the United Kingdom Chamber of Shipping.

The Union Steel Corporation of

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

British Prices f.o.b. United Kingdom Ports

Ferromanganese, export	£11 10s.	55.95
Billets, open-hearth	5 15	to £6 5s.
Black sheets, Japanese specifications	12 5	59.61
Tin plate, per base box	0 18	to 0 18 1/4
Steel bars, open-hearth	7 15	to 8 5
Beams, open-hearth	7 7 1/2	to 7 17 1/2
Channels, open-hearth	7 12 1/2	to 8 12 1/2
Angles, open-hearth	7 7 1/2	to 7 17 1/2
Black sheets, No. 24 gage	9 15	to 10 0
Galvanized sheets, No. 24 gage	11 17 1/2	2.57

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£3 2 1/2 s. to £3 3 1/2 s.	\$15.21 to \$15.45
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Billets, Thomas	4 13	to	4 14	22.63 to	22.87
Wire rods, low C. No. 5 B.W.G.	6 2	to	6 4	29.69 to	30.19
Rails, light	6 0			29.20	
Black sheets, No. 31 gage, Japanese	11 5	to	12 12	54.68 to	58.32
Steel bars, merchant	4 15	to	4 17	Cents a Lb.	1.03 to 1.04
Steel bars, deformed	4 14	to	4 15	1.02 to	1.03
Beams, Thomas, British standard	5 1	to	5 2 1/2	1.11 to	1.14
Channels, Thomas, American sections	5 12	to	5 14	1.24 to	1.26
Angles, Thomas, 4-in. and larger, over 3/4-in. thick	5 6			1.17	
Angles, Thomas, 3-in.	5 7 1/2			1.18	
Hoop and strip steel over 6-in. base	5 15			1.27	
Wire, plain, No. 8 gage	6 12 1/2			1.43	
Wire, barbed, 4-pt. No. 12 B.W.G.	10 12 1/2			2.30	
Wire nails, base	6 7 1/2			\$1.42 a keg	

South Africa reports a working loss last year of £36,000 (\$175,176), a result of reorganization alterations to meet special contracts and high cost of experimental work in the production of a suitable steel to meet such contracts.

The Skoda Works is redeeming its 7½ per cent debenture bonds and substituting 6 per cent debentures. The company states that the value of unexecuted orders in hand today is £16,000,000 (\$77,856,000), assuring a greater output in 1930 and 1931 than last year.

Czechoslovakian steel works are withdrawing from the Jugoslavian market, which, by agreement, has been divided between the Alpin Montan Gesellschaft and the Rima-murany company.

The Dutch-German plan for erecting a large thin sheet mill outside the German sheet syndicate has been postponed, and may be abandoned.

The Japanese Government steel works is said to be prepared to join the International Rail Makers' Association, provided the latter ceases selling rails to Japan and agrees to divide China and Manchuria on an agreed ratio.

Czechoslovakian output in May was 123,000 tons of pig iron and 162,000 tons of raw steel. French output in May was 899,000 tons of pig iron, 853,000 tons of raw steel and 590,000 tons of rolled steel. Luxemburg output in May was 212,000 tons of pig iron and 189,000 tons of raw steel with 28 blast furnaces active at the end of May.

Corrosion-Resisting Steel Sought for Tank Ships

LONDON, ENGLAND, July 3.—Development of a corrosion-resisting steel for use in tank ship construction is being investigated by steel companies and shipbuilders. Recent discussion of the effective life of a tank ship has brought the conclusion that carrying certain spirits and light oils has a strong corrosive effect, and many are inclined to fix the life of such a cargo-carrying vessel at not more than 15 years. Engineers have found it difficult to keep such tankers spirit-tight, and much riveting must be renewed, as well as the plates.

Metallurgists have been seeking to develop a low-cost corrosion-resisting

steel or a coating composition for ordinary steel, but without much success. With transport of spirits increasing, maintenance costs on tank ships carrying such cargoes is advancing.

British Steel Output Still Declining

LONDON, ENGLAND, July 12 (By Cable).—Production of iron and steel in the United Kingdom underwent another decline in June. Output of pig iron was 563,200 gross tons, and steel ingots and castings, 600,100 tons. This year's monthly production, in gross tons, is shown below.

	Pig Iron	Steel
June, 1930.....	563,200	600,100
May, 1930.....	614,500	692,800
April, 1930.....	619,600	696,100
March, 1930.....	665,800	826,100
February, 1930.....	597,000	776,400
January, 1930.....	650,000	771,100
Monthly average, 1929	631,600	800,600

Exports of Molybdenum May Be Reduced

HAMBURG, GERMANY, July 1.—Increased supplies of molybdenum from Austria and Japan are expected to curtail sales of American molybdenum to German and other Continental consumers. The United States has been supplying the greater part of Continental requirements, and in 1929 Germany imported about 95 per cent of requirements from the United States. Another factor in cutting American exports of molybdenum to Germany is the unsatisfactory condition of the alloy steel market, which has reduced German demand for all alloys.

German Rivet Makers Plan Mergers

HAMBURG, GERMANY, July 1.—Absorption of obsolete plants through mergers and general modernization of methods are planned by German rivet makers as a means of reducing costs and meeting the situation brought about by the increasing vogue of welding. Rivet manufacturers in Germany have had their business with river shipyards considerably curtailed since the introduction of welded river vessels. The Nienhandel G.m.b.H. of Essen has been formed

by the rivet makers to negotiate mergers.

Soviet Buys 120,000 Tons of Steel from Poland

HAMBURG, GERMANY, July 1.—A contract for 120,000 tons of plates, shapes, bars and sheets for delivery over the next nine months has been placed in Poland by the Soviet Union. Negotiations were carried on with Czechoslovakian makers, but agreement could not be reached on terms of payment and deliveries.

German Cable Makers Build Foreign Plant

HAMBURG, GERMANY, July 1.—The recent decision of German cable makers to establish plants in high-tariff countries has been followed by the announcement that a large cable works will be constructed near Warsaw, Poland. It will be controlled and operated by a number of German cable manufacturers, including the Allegemein Electricitäts Gesellschaft and Felten & Guilleaume, and will be large enough to supply the Polish Government's requirements. Another plant is planned for construction in Japan.

Ford Builds City Docks at Cologne

COLOGNE, GERMANY, July 3.—German motor car manufacturers have been protesting at the advantages granted by the city to the new Ford plant, which will have considerably smaller tax burdens than other plants. This is partly explained by the fact that the Ford company is building and defraying the entire cost of docks, which will eventually revert to the city.

Cheaper Tungsten Ore for High-Speed Steel

HAMBURG, GERMANY, July 1.—The steady fall in the price of tungsten ore from 42s. (\$10.21) per unit a year ago to 34s. (\$8.26) per unit in February, this year, and recently to 18s. 9d. (\$4.37) per unit is causing a reduction in the prices of high-speed steel. It is also expected to affect the price of tungsten-carbide metal (Widia) before long.

Germany Postpones Zinc Duty

HAMBURG, GERMANY, July 1.—Application of an import duty on zinc in Germany has been postponed until fall. A commission consisting of consumers, producers and representatives of the Government which was appointed to investigate the question, has been unable to reach an agreement; so zinc will temporarily be duty free.

Sources of American Imports of Iron Ore

	(In Gross Tons)		Five Months Ended May	
	May	1930	1930	1929
Canada	3	5	153	167
Cuba	39,054	56,400	183,654	269,900
Chile	138,833	130,316	840,806	646,085
Spain	7,900	13,048	42,383	31,416
Sweden	15,797	22,723	85,219	95,751
French Africa	51,230	25,800	128,775	84,980
Other countries	38,555	27,470	120,766	95,484
Total	291,372	275,762	1,401,756	1,223,783

From Department of Commerce.

Machinery Markets and News of the Works

Improvement Looked For

Although Machine Tool Volume in June Was Less Than in May, Some Builders Experienced a Gain

ORDERS for machine tools in June fell off only 7 per cent from those of May, according to the findings of the National Machine Tool Builders' Association. It appears that there were actual increases for the largest and smallest classes of plants, which increases, however, were more than cancelled by the drop in business received by the plants of intermediate size. The facts are taken to indicate a likely early improvement, perhaps in July.

The index of gross orders was 125.8 against 135.2, in May. This indicates that the volume of orders was 25.8 per cent better than the value of

average monthly shipments for the three years ended with 1924, the performance of these three years being taken for the base.

This week's district reports on the pages that follow reflect a featureless market, with inquiry noticeably off. Delay in closing much of the pending business is attributed largely to slowness in getting financial appropriations. Sellers are urging replacements at such a time as this when production may suffer the least by any interruption. In the Pittsburgh district, active promotion work is said to be holding business at the average June level.

New York

NEW YORK, July 15.—Inquiry for machine tools has increased slightly since the holiday, but is still rather limited. Sellers are urging the present period of restricted production as highly desirable for replacement of old equipment, but in most cases sufficient appropriations are not available. Improved operations among users of machine tools are spotty. Certain radio manufacturers are entering upon their production programs and are pressing for prompt delivery of a few additional tools. An electric refrigerator manufacturer has booked sufficient business recently to fix a regular production schedule for the next 12 months.

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Brooklyn Brass Works, Inc., 263 Scholes Street, Brooklyn, is asking bids on general contract until July 23 for two-story and part basement foundry addition, 25 x 100 ft., to cost about \$40,000 with equipment. Lee & Hewitt, 152 Market Street, Paterson, N. J., and 53 Park Place, New York, are architects.

Lehigh Valley Railroad Co., 143 Liberty Street, New York, and Starrett Investing Co., 101 Park Avenue, affiliated with Starrett Brothers & Eken, Inc., builder and contractor, same address, have plans for a 15-story freight and industrial terminal on block bounded by Twenty-sixth

and Twenty-seventh Streets, Eleventh and Thirteenth Avenues, with elevating, conveying, loading and other mechanical-handling equipment, to cost over \$8,000,000. Russell G. Cory, 30 Church Street, is architect and engineer.

Vacuum Oil Co., 61 Broadway, New York, will soon begin construction of one and two-story and basement addition to plant at Paulsboro, N. J., 40 x 75 ft., to cost about \$45,000 with equipment.

Frank Pisch, Inc., New York, has leased a floor in building at 318-20 West Forty-eighth Street for new plant to manufacture stage-lighting equipment and devices.

W. P. Gross Tanner & Co., 25 Beaver Street, New York, flour, have plans for seven-story storage and distributing plant at West New Brighton, S. L., to cost over \$100,000 with equipment. Russell G. Cory, 30 Church Street, New York, is architect and engineer.

New York Central Railroad Co., 466 Lexington Avenue, New York, has authorized plans for a four to seven-story freight terminal to occupy four blocks bounded by West, Washington, Clarkson and Spring Streets, 250 x 1250 ft., with conveying, loading, elevating and other mechanical-handling equipment, to cost about \$14,000,000.

Board of County Supervisors, White Plains, N. Y., has authorized a fund of \$150,000 for new power plant at Grasslands Hospital, Eastview, for which plans

will be drawn under direction of County engineer.

Max Siegel and George H. Levy, 1775 Broadway, New York, architects, have taken out a permit for a four-story automobile service, repair and garage building, to cost \$200,000 with equipment.

Samuel Goldstone, 412 Rutgers Street, Utica, N. Y., and associates have organized Valley Iron & Metal Corporation, with capital of \$25,000, to operate local plant for manufacture of metal products.

Viking Tool & Machine Co., 745 Sixty-fifth Street, Brooklyn, manufacturer of special machinery, precision instruments, etc., has purchased former plant of Eck Dynamo & Motor Co., Belleville, N. J., consisting of three acres improved with two main factories, two and three stories. Purchasing company will remove present plant to new location, where capacity will be increased. One floor of two-story unit has been leased to American Cable Co., 230 Park Avenue, New York, for a storage and distributing plant.

Edward C. Kolb, 100 Prospect Street, Newburgh, N. Y., and associates have formed Storm King Oil Burners, Inc., with capital of \$20,000, to operate local plant for manufacture of oil burners and oil-burning equipment. George R. Kron, Taylor Place, Cornwall-on-Hudson, N. Y., is interested in new organization.

Calco Chemical Co., Bound Brook Road, Bound Brook, N. J., has awarded general contract to Wigton-Abbott Co., 552 West Twenty-third Street, New York, for two-story addition, 103 x 217 ft., for storage and distribution, to cost over \$50,000 with equipment. Francis Y. Joannes, 420 Lexington Avenue, New York, is architect.

Board of Education, Lyndhurst, N. J., is considering installation of manual training equipment in new two-story and basement junior high and grade school, to cost over \$400,000, for which plans will be drawn by Guilbert & Betelle, 20 Bradford Place, Newark, architects.

Adam Black & Sons, Inc., 54 Cambridge Avenue, Jersey City, N. J., manufacturer of automobile bodies, has superstructure under way for new one-story plant, 150 x 260 ft., to cost more than \$75,000 with equipment. William Neumann, 26 Journal Square, is architect.

Peerless Soda Fountain Service Co., 972 Broad Street, Newark, manufacturer of soda fountain equipment, has leased one-story building at 10-12 North Third Street, totaling about 5000 sq. ft. floor space, for new plant.

DeForest Radio Co., Factory Street, Passaic, N. J., has authorized a note issue to total \$800,000, part of proceeds to be used for expansion.

C. M. Grey Mfg. Co., 358 Central Avenue, East Orange, N. J., manufacturer of die-castings and other metal products, is securing permission from local zoning board for new plant on Central Avenue, to cost close to \$70,000 with equipment. Austin Co., 120 Broadway, New York, is architect and engineer.

Philadelphia

PHILADELPHIA, July 14.—Aviation Corporation, 122 East Fortieth Street, New York, is negotiating with City Council, Philadelphia, for lease of 22 acres of land at proposed municipal air-rail-marine terminal at Hog Island, which city is purchasing from Government, as site for new plant for manufacture of seaplanes and flying boats, including parts production and assembling. Initial unit will approximate 50,000 sq. ft., and will cost over \$200,000 with equipment. Later other buildings will be erected to give floor area of over 500,000 sq. ft. Company operates Fairchild Aviation Corporation, with plant at Farmingdale, L. I. Proposed production at Hog Island will be a new development.

Reading Co., Reading Terminal, Philadelphia, has arranged for a bond issue of \$15,000,000, considerable part of fund to be used in connection with electrification of lines, work on which is in progress. Entire program covers 60 miles and will cost \$20,300,000 with shops for repair and reconditioning, power substations, etc. Company is also planning for electrification of system through Schuylkill Valley as far as Reading, Pa., and from Philadelphia to New York, to cost \$32,000,000. A five-acre tract has just been purchased at Tabor Road and railroad right-of-way for expansion in operating facilities in that district. Company engineering department is in charge of electrification program.

Sitley & Son, Inc., Camden, N. J., flour, is asking bids on general contract for rebuilding mill recently destroyed by fire, to be two stories and basement, 117 x 162 ft., to cost over \$70,000 with equipment. Part of unit will be given over to storage and distribution. Clarence E. Wunder, 1520 Locust Street, Philadelphia, is architect.

Neidich Process Co., Burlington, N. J., manufacturer of processed paper goods, etc., will proceed with addition to plant, three stories and basement, 60 x 128 ft., including one-story top addition to present building, 60 x 68 ft., for which general contract has been let to Karno-Smith Co., Inc., Broad Street Bank Building, Trenton, N. J., to cost close to \$90,000 with equipment. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, is architect and engineer.

Treadwell Engineering Co., Easton, Pa., manufacturer of steel mill equipment, is arranging for a capacity production. Company has received an order from Illinois Steel Co., Chicago, for a 96-in. high production plate mill, with accessories, totaling about \$1,500,000.

South Atlantic

BALTIMORE, June 14.—Following recent acquisition of Berliner-Joyce Aircraft Corporation, Baltimore, by North American Aviation, Inc., 40 Flatbush Avenue Extension, Brooklyn, N. Y., acquiring company has organized B-J Aircraft Co., to take over and operate local plant. Expansion is proposed for production of aircraft of other types, manufacturing of purchased company being devoted primarily to airplanes for Government. Thomas A. Morgan, president of Sperry Gyroscope Co., Brooklyn address noted, another subsidiary of purchasing company, will be president of new unit.

Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, has arranged for a bond issue of \$7,500,-

000, part of proceeds to be used for expansion and improvements. Company is operated by same interests which recently organized Safe Harbor Power Co., to construct a hydroelectric generating plant at Safe Harbor on Susquehanna River, on which work has been started, to cost over \$20,000,000, and will secure additional power from that new source, with construction of steel tower transmission lines, substations and other facilities.

Gulf Refining Co., Frick Annex, Pittsburgh, has acquired property at Pulaski, Va., and will soon begin construction of new oil storage and distributing plant to cost close to \$75,000 with equipment. Company engineering department in charge.

In-Door Sports Corporation, Greensboro, N. C., recently organized by H. D. Aiken, Southern Life & Trust Building, is planning operation of local factory for manufacture of amusement devices. H. C. Parks, Silver City, N. C., is interested in new organization and will be an official of company.

Arlington County Board of Education, Rosslyn, Va., plans installation of manual training equipment in addition to Washington and Lee High School at Ballston, to cost about \$250,000, for which bids have been asked on general contract. Raymond Long, architect, State board of education, Richmond, Va., is in charge.

United States Cold Storage Co., 2101 West Pershing Road, Chicago, is planning for new multi-story cold storage and refrigerating plant on site recently acquired at Atlanta, Ga., to cost over \$1,500,000 with machinery. A Epstein, address noted, is architect and engineer.

Virginia Electric & Power Co., Richmond, Va., has acquired City Gas Co., Norfolk, Va., operating artificial gas plants and systems, and will consolidate. Purchasing company contemplates expansion and betterments in Norfolk district.

Armour Fertilizer Works, Inc., Atlanta, Ga., plans rebuilding part of main unit and adjoining structures destroyed by fire July 9. Headquarters are at 111 West Jackson Boulevard, Chicago.

Pittsburgh

PITTSBURGH, July 14.—Business has gained no momentum in the first half of the month, but most dealers are glad to report that demand is holding at about the same rate as the June average. Generally speaking, orders for new tools in this district have not fallen below 80 per cent of the 1929 average so far this year, and this showing is considered satisfactory in view of industrial depression in the district. Also, the railroads, which bought considerable equipment last year, have added little to order books in 1930.

Constant sales pressure on the part of some dealers is doing much to hold business at present levels. Engineering representatives of local offices are very busy with promotion work, which is resulting in fair orders in many cases. Although sizable tool lists are exceptional, the volume of single orders is keeping up. New inquiry is light, but is well distributed throughout the district.

General Electric Co., Erie, Pa., is arranging for expansion at electric refrigerator manufacturing plant at Wesleyville, in Erie district, to double present capacity, to cost over \$400,000 with machinery. H. R. L. Emmet is works manager at local plant.

Beckwith Machinery Co., 500 Arch Street, Pittsburgh, manufacturer of tractors and tractor equipment, has purchased property at East Liberty as site for new factory branch, service, repair and sales building, for which plans will be prepared at once, to cost over \$65,000 with equipment. An overhead traveling crane will be installed.

John W. Patton Co., Clarksburg, W. Va., recently organized by John W. Patton, F. C. Devericks, Clarksburg, and associates, is planning establishment of new plant in West End district for production of sheet glass shelving, windshields and kindred products.

W. B. Tracy, Webster Springs, W. Va., and associates are planning construction of hydroelectric generating plant at Cathole Falls, where planing and lumber mill will be erected by same interests. Generating station will be used primarily for mill operation. Entire project will cost close to \$100,000.

Armstrong Cork Co., Twenty-fourth Street, Pittsburgh, operating Armstrong Cork & Insulation Co., is disposing of a bond issue of \$14,931,000, part of proceeds to be used for expansion and betterments. Company has ten plants in different parts of the United States and six plants in Spain, as well as a number of assembling plants. John J. Evans is president.

New England

BOSTON, July 14.—Machine-tool demand is lifeless, and users give no indication as to when they will purchase the many tools that have been under negotiation. Used tools, heretofore the brightest spot in the trade, are also in poor demand.

Miller & Levi, Boston, architects, have awarded contract for a bottling plant in Roxbury district. Conveying equipment will be bought.

Connecticut Co., New Haven, Conn., has awarded general contract for a power substation at West Haven. Electrical equipment is under consideration.

Hartford Electric Light Co., Hartford, Conn., will build a coal tower and conveyor at South Meadows, Conn., to cost \$95,000 with equipment.

United Shoe Machinery Co., Beverly, Mass., contemplates building a tuck factory addition at East Jaffrey, N. H., for which considerable machinery will be purchased.

Trustee for Florence Blotz, care of L. G. Foster, architect, Mansfield, Mass., will build an airport hangar, office building and machine shop, two stories, 75 x 80 ft., to cost \$20,000 without equipment.

Frank Crook, Inc., Pawtucket, R. I., has plans for a sales and service automobile plant, one and two stories, 170 x 250 ft., to cost \$200,000 with equipment. A machine shop is under consideration.

Board of Education, Portsmouth, N. H., plans installation of manual training equipment in new junior high school, to cost about \$300,000, for which bids are being asked on general contract until July 25. Ashton, Huntress & Alter, 477 Essex Street, Lawrence, Mass., are architects.

General Motors Truck Co., 781 Worthington Street, Springfield, Mass., a unit of General Motors Corporation, Detroit, has filed plans for a two and three-story service, repair and garage building, 125 x 175 ft., at West Springfield, to cost close to \$140,000 with equipment.

Springfield Railway Co., Springfield,

Mass., is considering rebuilding part of car barns on Hooker Street, including inspection and repair facilities, destroyed by fire July 3, with loss close to \$40,000.

Municipal Electric Light Department, Marblehead, Mass., has plans for a two-story equipment storage, service and repair building, to cost about \$50,000 with equipment. W. H. Quiner, 75 Pleasant Street, is architect.

Albree Marble & Tile Co., Inc., 9 Ashland Street, Dorchester, Boston, has awarded general contract to I. H. Bogart Co., 60 State Street, for new one-story plant, 100 x 100 ft., to cost about \$60,000 with equipment. W. P. Hatch, 60 State Street, is architect.

Board of City Trustees, Mansfield, Mass., is considering establishment of municipal airport, including hangar, machine and reconditioning shop and other field units, to cost over \$45,000 with equipment.

Board of Public Welfare, Providence, R. I., is planning erection of a cannery factory at Exeter School, to cost over \$60,000 with machinery. It is proposed to establish similar units later at State penal, reformatory and charitable institutions.

Ira D. Lambert, 29 Ontario Street, Providence, R. I., and associates have organized Arrow Tool Co., to operate local plant for manufacture of tools and other equipment.

Buffalo

BUFFALO, July 14.—Pierce, Butler, Pierce Mfg. Co., 282 James Street, Syracuse, N. Y., manufacturer of stoves, ranges, etc., is considering early call for bids for rebuilding part of plant recently destroyed by fire, to cost over \$150,000 with equipment.

Corson Mfg. Co., 138-40 Main Street, Lockport, N. Y., manufacturer of paper boxes and containers, has awarded general contract to William B. Eaton, Olson Building, for new one-story plant, 140 x 150 ft., to cost about \$65,000 with machinery.

Board of Education, Genesee Building, Buffalo, has issued the following list of equipment to be installed in Burgard Vocational High School, bids to be received until July 31: Automobile mechanical and electrical repair equipment, electric and chain hoists, overhead track systems and trolleys, drills, floor grinders, floor buffers, flexible shaft buffers, portable and other sanders, motor-generator sets and wood-working equipment; also benches and bench furnaces, combination chassis and engine-testing equipment, storage battery charging motor-generator set, storage battery repair and testing equipment, laboratory apparatus, tire repair equipment, spraying machinery, drafting room equipment, oxy-acetylene and electric welding and lead burning equipment. James Storer is secretary.

Frank B. Baird, 1069 Delaware Avenue, Buffalo, and George C. Sweet, 1008 Liberty Bank Building, have organized Buffalo Pipe & Foundry Co., with capital of \$100,000, to operate a local foundry for production of cast iron pipe and kindred products.

International Business Machines Corporation, Endicott, N. Y., manufacturer of automatic computing scales, time-recording equipment and other machines, has begun erection of addition, totaling about 60,000 sq. ft. floor space, to cost over \$100,000 with equipment.

W. E. Biggers Rochester Corporation, Rochester, N. Y., has been formed by

The Crane Market

Business in overhead and locomotive cranes is small with only a small volume of current inquiry. The list of overhead cranes and other equipment, including a locomotive crane for the 20th Street yards of the new subway in New York, bids on which opened July 8, brought out a low bid of \$173,385 from the Harnischfeger Corporation. The next to the lowest bidder was the Columbia Contracting Co. Protests have been registered that the low bid was not submitted in the regular prescribed manner, so that action in making an award may be delayed. Recent sales of overhead cranes included two 10-ton, 3-motor cranes, of 58-ft. and 52-ft. 4-in. spans sold to the Quaker City Iron Works, Philadelphia, by the Shepard Niles Crane & Hoist Corporation.

William E. Biggers, Park Lane Apartments, and associates, and plans operation of local plant for manufacture of electric generating machinery and parts.

Cleveland

CLEVELAND, July 14.—With few sales the past week, the machine-tool business continued to show a downward tendency. There is very little inquiry even for single machines. Aside from suspensions for two weeks' vacation by many metal-working plants, there is little change in plant operations this month as compared with June. Although little encouragement is found in the present situation, some machine tool manufacturers and dealers report a slight improvement in sentiment among metal-working plants.

Cleveland Trencher Co., 20100 St. Clair Avenue, Cleveland, manufacturer of digging machinery, parts, etc., has plans for one-story addition, 60 x 90 ft., to cost about \$35,000 with equipment. Paul S. Schmidt, 4500 Euclid Avenue, is architect and engineer.

Toledo Edison Co., 512 Jefferson Avenue, Toledo, Ohio, has secured permission to issue bonds in amount of \$2,293,800, and preferred stock totaling \$1,527,300, part of proceeds to be used for expansion and betterments in power plants and system.

W. O. Holst Builders' Supply Co., 414 South Erie Street, Toledo, Ohio, is planning to rebuild part of storage and distributing plant recently destroyed by fire.

Following recent merger with Continental Steel Products Co., Youngstown, Ohio, manufacturer of electric switch boxes and kindred sheet steel electrical products, Adalet Mfg. Co., 4610 St. Clair Avenue, Cleveland, manufacturer of electrical specialties, has arranged with Chamber of Commerce, Greenville, Pa., for new one-story plant, 60 x 145 ft., at that place, to be occupied under lease, to cost over \$50,000 with equipment.

Gulf Oil Corporation, Frick Annex, Pittsburgh, is planning for early expansion in oil refinery of Paragon Refining Co., 2935 Front Street, Toledo, Ohio, comprising new production units, storage and distribution facilities, to double present capacity, to cost close to \$2,000,000 with machinery.

Mullins Mfg. Corporation, Mill Street, Salem, Ohio, is planning maximum pro-

duction for automobile body manufacture, with tool and die departments on day and night basis. Company recently secured an order for steel bodies totaling close to \$2,000,000.

American Welding & Mfg. Co., Warren, Ohio, has disposed of its plant No. 2 in Warren to United States Gypsum Co., Chicago, and has concentrated manufacturing operations in its main factory building, known as plant No. 1. Equipment and materials in plant No. 2 are being transferred as rapidly as space is available.

Milwaukee

MILWAUKEE, July 14.—Dullness pervades the machine-tool trade, although there has been some relief from the stagnation of inquiries and orders attending the recent holiday. Current orders are mostly urgent, while nearly all inquiries consist of one or two items, mainly for replacement. Few important industrial building projects are appearing, but work on those recently started is going forward. The employment curve in Milwaukee is slightly upward.

Trackson Division, George H. Smith Steel Casting Co., 500 Clinton Street, Milwaukee, is occupying first unit of new plant, employing 100 on full time. Force will be considerably increased when installation of furnaces and other equipment in heat treating department is completed later this month. Division manufacturers crawler attachments for tractors and tractor devices for construction industry, yard work, etc.

Frank J. Henry, Wisconsin Rapids, Wis., is successful bidder for general contract on new \$550,000 high school and field house at Wisconsin Rapids. School will contain manual training and domestic science departments. E. J. Winden is clerk of school board.

Wisconsin Land & Lumber Co., Herkimer, Mich., is starting work on a two-story unit, 60 x 110 ft., for manufacturing toys, novelties and other specialized hardwood products, to cost \$50,000, with equipment.

Board of Vocational Education, South Milwaukee, Wis., has approved plans by Parkinson & Dockendorff, architects, LaCrosse, Wis., for new vocational school, 60 x 170 ft., two stories and basement, costing about \$100,000. Bids will be asked at once on construction and on equipment later. Henry Smith is city superintendent of schools.

Milwaukee County Board of Supervisors has placed contract with Steve Czaplewski & Sons, Inc., 878 Second Avenue, Milwaukee, for hangar No. 2, 100 ft. sq., at Milwaukee County Airport, for use by Hamilton Metalplane Corporation, Milwaukee, division of Boeing Aircraft Corporation. Major Stanley E. Phasecki is airport manager.

Stover Signal Mfg. Co., 252 Milwaukee Street, Milwaukee, has changed its name to Instant-Freeze Corporation. When established at Racine, Wis., several years ago, company manufactured electric automobile lighting signals, but since moving to Milwaukee specializes in ice cream freezers for home, and other domestic utilities.

Northern Conveyor & Mfg. Co., Janesville, Wis., which recently increased its capital stock, has completed large plant extensions for manufacture of power loaders for coal yards and mining machinery for underground loading.

J. B. Whitnall, president, reports that business for first six months of 1930 is slightly more than 11 per cent ahead of same period last year.

Chicago

CHICAGO, July 14.—Edgar T. Ward & Sons Co., 1435 West Thirty-seventh Street, Chicago, iron and steel products, has work under way on new one-story plant, 125 x 242 ft., in central manufacturing district, and will occupy with its affiliated organization, Columbia Flexible Shaft Co., to cost over \$100,000. Company will remove present storage and distributing plant to new location and will increase capacity. Last-noted plant has been purchased by Industrial Cartage Co., 1535 West Forty-third Street.

United States Metal Products Co., 2300 West Fifty-eighth Street, Chicago, contemplates a one-story addition, totaling about 16,000 sq. ft. of floor space, to cost over \$50,000 with equipment.

Northwest Automatic Products Co., 138 Holden Street, Minneapolis, Minn., manufacturer of mechanical equipment, has plans for one-story plant, 85 x 90 ft., to cost close to \$27,000 with equipment. Martin G. Linquist, Security Building, is architect. Glen Roberts is president.

Public Service Co. of Northern Illinois, 72 West Adams Street, Chicago, has arranged for a bond issue of \$15,000,000, part of proceeds to be used for expansion and betterments.

Midland Oil Refining Co., Midland Savings Building, Denver, is planning new oil refinery on right-of-way of Santa Fe Railway to cost over \$400,000 with machinery.

Board of Education, City Hall, Minneapolis, Minn., is considering installation of manual training equipment in two-story and basement addition to Corcoran Junior High School, for which bids will soon be asked on general contract, to cost \$300,000. Bureau of Buildings Division of Design, City Hall, is architect and engineer.

Prater Pulverizer Co., 817 West Washington Boulevard, Chicago, manufacturer of pulverizing machinery, parts, etc., has awarded general contract to Regan Construction Co., 228 North La Salle Street, for a one-story plant unit to cost about \$65,000 with equipment. Olsen & Urbain, 228 North La Salle Street are architects.

Farmers' Union Terminal Association, Minnesota Building, St. Paul, Minn., M. W. Thatcher, general manager, will soon begin construction of grain elevator addition, capacity of 1,000,000 bu., with elevating, conveying, screening and other mechanical equipment, to cost about \$115,000.

Detroit

DETROIT, July 14.—Brunswick Radio Corporation, Laketon Street, Muskegon, Mich., a subsidiary of Warner Brothers Pictures, Inc., 321 West Forty-fourth Street, New York, will soon begin erection of multi-story addition, 275 x 400 ft., to cost about \$350,000 with equipment.

Chance Processed Steel Co., Detroit, recently organized by Charles T. Chance, 300 Whitmore Road, and associates, is considering early operation of local plant.

Parke, Davis & Co., McDougall Avenue and Detroit River, Detroit, has plans for addition to power plant at chemical works, to cost over \$50,000 with equipment. Smith, Hinchman & Grylls, Mar-

quette Building, are architects and engineers.

Board of Education, Grand Rapids, Mich., is considering installation of manual training equipment in three-story and basement addition to Ottawa Hills High School, to cost about \$225,000, for which bids are being asked on general contract until July 21. H. Turner, Michigan Trust Building, is architect.

Iron Mountain Cylinder Grinding & Machine Co., Iron Mountain, has plans for a one-story machine shop addition.

Grand Trunk Western Railroad Co., Grand Trunk System, 400 East Jefferson Street, Detroit, is planning new engine house with shop and repair facilities at Simpson, to cost about \$35,000 with equipment. Company is considering installation of mechanical-handling, conveying and other equipment on new dock to be constructed at Muskegon, to cost about \$350,000, for which general contract has been let to Edward E. Gillan Co., Milwaukee.

Parsons Co., 603 East Milwaukee Street, Detroit, manufacturer of automobile parts and kindred mechanical equipment, has arranged for increase in capital from \$100,000 to \$250,000 part of fund to be used for expansion.

Howell Electric Motors Co., Howell, manufacturer of industrial motors and parts, will soon break ground for a two-story addition to cost about \$50,000 with equipment. R. S. Gerganoff, 206 North Washington Street, Ypsilanti, is architect.

Alamo Corporation, Hillside, has arranged for change of company name to Electro Products Corporation, and will specialize in manufacture of electrical products.

Cincinnati

CINCINNATI, July 14.—With many plants in this district closed for vacations, the machine-tool market is dull and featureless. Demand has declined sharply, and inquiry has also fallen off. The majority of old inquiries are still considered as pending business since buyers indicate that the failure of appropriations for new equipment has deferred purchases at this time.

City Council, Dayton, Ohio, is considering establishment of aviation school at municipal airport, consisting of units for repairs and parts manufacture, laboratories, instruction, etc., to cost about \$300,000 with equipment. City engineering department will be charge.

Rendigs, Panzer & Martin, Southern Ohio Bank Building, Cincinnati, architects, have filed plans for a seven-story automobile service, repair and garage building, 100 x 111 ft., to cost close to \$200,000 with equipment.

Kentucky Utilities Co., Inc., Louisville, affiliated with Kentucky Power & Light Co., and Old Dominion Power Co., same address, is arranging for expansion, including installation of new boiler, stoker and auxiliary equipment at electric generating station at Maysville, Ky., construction of transmission lines, etc., to cost about \$161,000. Company engineering department is in charge.

Board of Education, Chattanooga, Tenn., is considering installation of manual training equipment in new three-story high school at North Chattanooga, to cost about \$175,000, for which general contract has been let to John Parks Co., Hamilton National Bank Building. W. H. Sears, James Building, is architect.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until July 22 for 300 filter, 500 cap and 600 cap and adapter assemblies; until July 23 for 10 hub assemblies; until July 28 for 11 hub and dowel assemblies, nuts, nut-locking rings, plate assemblies, bolts, brackets, screws, etc.

Raymond Paper Bag Co., Middletown, Ohio, has awarded general contract to F. K. Vaughn, Middletown, Ohio, for plant to cost close to \$200,000 with machinery.

Dayton Biscuit Co., Dayton, Ohio, has purchased site at Breakwater Avenue, N. W., and West Sixty-fifth Street, Cleveland, for a new factory branch and distributing plant, to cost about \$40,000 with equipment.

J. E. Bobb, 551 South Second Street, Louisville, and associates have organized Springless Scales Co., with capital of \$30,000, and plan operation of local factory for manufacture of patented springless scales, including parts and assembling.

St. Louis

ST. LOUIS, July 14.—St. Louis Portland Cement Co., recently organized by C. Boettcher, president, Ideal Cement Co., Denver, is selecting site in St. Louis industrial district for a new cement mill, for which plans will be drawn soon, to cost close to \$2,000,000 with machinery. It will operate under wet process. Company will also develop large stone quarry in vicinity. Mr. Boettcher will be president of new organization; R. J. Morse, Ideal Cement Co., will be secretary and general manager.

Planters' Cotton Oil Co., 1021 East Fifth Street, Pine Bluff, Ark., has awarded general contract to E. C. Royce Construction Co., National Building, for one-story addition, 75 x 175 ft., to cost about \$40,000 with equipment. Part of unit will be used for storage and distribution.

Hoevels Elevator & Storage Co., Stuttgart, Ark., recently organized by J. C. Robbins and G. E. Hammans, both of Stuttgart, is planning construction of rice elevator, with conveying, elevating and other mechanical-handling equipment, including drying, screening and cleaning department, to cost over \$115,000 with machinery. A storage and distributing plant will also be built.

Board of Education, Ferguson, Mo., plans installation of manual training equipment in new high school to cost over \$250,000, for which plans will be prepared by William B. Ittner, Inc., Continental Life Building, St. Louis, architect.

Colgate-Palmolive-Peet Co., Kansas and Seventeenth Streets, Kansas City, Mo., manufacturer of soaps, has awarded general contracts to Darby Corporation, 923 North Third Street, and Kansas City Structural Steel Co., Twenty-first Street, for multi-story addition for handling liquid soap products, to cost about \$150,000 with machinery.

Chicago, Burlington & Quincy Railroad Co., 547 West Jackson Boulevard, Chicago, has authorized rebuilding of grain elevator at Omaha, Neb., recently destroyed by fire, to cost about \$300,000 with screening, cleaning, conveying and other mechanical equipment. Elevator will be operated under lease by Nebraska-Iowa Grain Co., Omaha.

J. R. Greenwood, head of Greenwood Realty Co., Texarkana, Ark., and associates, are planning erection of one-story

ice-manufacturing and cold storage plant, to cost about \$40,000 with machinery.

St. Joseph Railway, Light & Power Co., Sixth and Francis Streets, St. Joseph, Mo., will soon take bids on general contract for two-story and basement equipment storage and distributing plant, with repair facilities, to cost about \$60,000. Walter Boschen, Tootle-Lacy Building, is architect.

St. Louis Screw & Bolt Co., E. J. Miller, president, 6900 North Broadway, St. Louis, is installing machinery for rolling steel bars, to replace equipment for rolling bar iron. Company has not decided whether it will produce its own billets or buy them in open market.

Gulf States

BIRMINGHAM, July 14.—Phillips Petroleum Co., Bartlesville, Okla., has arranged for purchase of gasoline refinery of Dixon-Creek Oil Co., near Borger, Tex., with capacity of 12,000 gal. of finished material daily, and will operate in conjunction with chain of 14 other such plants in Texas and other States. Expansion and improvements are planned at Borger unit.

Galveston Electric Co., Galveston, Tex., is considering extensions and improvements in power plant at Avenue E and Twenty-sixth Street, to cost about \$85,000 with equipment.

International Paper Co., 100 East Forty-second Street, New York, is considering new mill for manufacture of paper bags and containers at Mobile, Ala., to cost over \$250,000 with machinery. Company is now operating a similar unit at same location on kraft paper stocks.

City Council, Shreveport, La., is asking bids on revised plans until July 22 for hangars and other buildings for municipal airport, for which bids recently were rejected, to cost about \$100,000 with equipment. Jones, Roessle, Oelschner & Wiener, Fort Worth, Tex., are architects; Southern Air Transport Co., Fort Worth, is interested in project.

Charles P. Limbert Co., Laurel, Miss., manufacturer of furniture, has awarded general contract to L. A. Gilly, Laurel, for new one-story L-shaped plant, 100 x 1000 ft., machinery to be electrically operated, to cost about \$150,000. Edward Freeback, Laurel, is architect.

San Antonio Public Service Co., San Antonio, Tex., is planning an addition to steam-operated electric power plant, with installation of 10,000-kw. turbo-generator unit and auxiliary equipment, to cost over \$125,000.

Bogalusa Coca-Cola Bottling Co., Inc., Bogalusa, La., has begun work on new two-story plant, 30 x 120 ft., with one-story extension, 60 x 90 ft., for production of carbonated beverages, including automatic bottling machinery, conveying equipment, etc., to cost close to \$50,000 with equipment. Pringle & Smith, Norris Building, Atlanta, Ga., are architects.

Auto Parts Co., 129 Clay Street, Jacksonville, Fla., has awarded general contract to G. W. Hessler, Inc., 111 West Ashley Street, for two-story plant, to cost about \$26,000 with equipment. Mark & Sheftall, Clark Building, are architects.

G. B. R. Smith Milling Co., Sherman, Tex., has awarded general contract to Jones-Hatelsater Co., Kansas City, Mo., for an addition to grain elevator and plant, to cost about \$175,000 with cleaning, screening, conveying and other equipment.

Board of School Trustees, Benton, Miss., has awarded general contract to H. J. Ogden, Benton, for a one-story vocational school building, to cost about \$40,000 with equipment. J. M. Spain, Merchants' Bank Building, Jackson, Miss., is architect.

William J. Murphy, 1322 Felicity Street, New Orleans, and associates, have organized Murphy Iron & Boiler Works, with capital of \$25,000, and plan operation of local plant for manufacture of boilers and other plate products.

Texas Power & Light Co., Dallas, Tex., will carry out expansion and improvements including line construction, to cost over \$100,000 with equipment.

Indiana

INDIANAPOLIS, July 14.—Indianapolis Power & Light Co., 48 Monument Circle, Indianapolis, is planning new steam-operated electric generating plant, with steel tower transmission line around city, to cost over \$3,000,000 with equipment.

Silent Alarm Co., 409 East Wiley Avenue, Marion, manufacturer of electric alarm specialties, has plans for a one-story factory, 35 x 45 ft., to cost about \$20,000 with equipment.

Midland United Co., Indianapolis, operated under direction of Middle West Utilities Co., 72 West Adams Street, Chicago, has acquired Liberty Light & Power Co., Cambridge Light & Power Co., and Liberty Camden Light & Power Co., operating near Richmond, and other points in eastern central Indiana. Purchasing company will consolidate with other light and power utilities and plans general expansion, including transmission lines. Company has also purchased Union Traction Co., Anderson, and Terre Haute, Indianapolis & Eastern Traction Co., Terre Haute.

McClelland Casket Hardware Co., Richmond, is planning to rebuild part of plant destroyed by fire July 4.

State Iron & Metal Co., Indianapolis, has been formed to take over and expand company of same name, with local plant at 415 South Illinois Street. Aaron Alpert heads new organization.

Pacific Coast

SAN FRANCISCO, July 10.—Shell Chemical Co., Shell Oil Building, San Francisco, recently formed as a subsidiary of Shell Oil Co., same address, has awarded general contract to George Wagner, Inc., 181 South Park Street, for initial units of new plant at Nichols, Cal., where 600 acres has been purchased, for manufacture of nitrogen products, including commercial fertilizers, ammonia, etc., to cost about \$4,000,000 with machinery. A machine shop and power house will be built. Engineering department of parent organization, address noted, is in charge.

Robert Hadley, 134 West Thirty-fifth Street, Los Angeles, has awarded general contract to J. C. Barruss, 735 South Harvard Boulevard, for one-story machine shop, 50 x 150 ft., to cost about \$24,000 with equipment. Leo Bachman, 331 South Western Avenue, is architect.

Ford Motor Co., Dearborn, Mich., has plans for new assembling plant on East Marginal Way, Seattle, consisting of main assembling unit, two stories, 100 x 320 ft., with adjoining structure, 100 x 500 ft., for parts, distributing, etc., power house, oil house, pumping station and other

buildings, to cost close to \$1,000,000 with machinery. Company also has plans drawn for a one-story addition to assembling plant at Long Beach, Cal., for expansion in pressed steel division, to cost over \$150,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer for both projects.

Sierra Pacific Electric Co., Reno, Nev., operating Truckee River Power Co., has purchased plants and system of Nevada Valleys Power Co., Lovelock, Nev., operating Canyon Power Co., and other utilities. Purchasing company will consolidate with its holdings, and plans expansion, including transmission lines.

Crane Co., Los Angeles, with headquarters at 836 South Michigan Avenue, Chicago, has awarded general contract to J. D. Sherer & Son, 1865 East Anaheim Street, Long Beach, for one-story factory branch and distributing plant, with pipe department, etc., 85 x 155 ft., on Anaheim Street, Long Beach, to cost close to \$40,000 with equipment.

Bureau of Power & Light, Water and Power Building, Los Angeles, has plans for a two-story automatic power substation, 75 x 103 ft., to cost about \$125,000 with equipment.

Pacific Coast Steel Co., Alaska Building, Seattle, has filed plans for three one-story additions to mill, 160 x 161 ft., 88 x 160 ft., and 60 x 74 ft., to cost over \$100,000 with equipment.

Municipal Power Department, Seattle, has arranged for a bond issue of \$2,500,000, majority of proceeds to be used for expansion and improvements, including new generating stations, substations and transmission lines. It is also planned to acquire existing stations for municipal power service.

Armstrong Mfg. Co., 4 Second Street, Portland, manufacturer of mechanical specialties, is considering one-story machine shop to cost about \$25,000 with equipment.

Canada

TORONTO, July 14.—Canadian Gypsum Co., Ltd., has started work on its mill at Hillsboro, N. B., first of a chain of plants to be located throughout Dominion, involving an expenditure of several million dollars for plants and equipment.

Fegles Construction Co., Minneapolis, Minn., has been awarded general contract for a 1,600,000-bu. addition to elevator at Fort William, Ont., owned by N. M. Patterson & Co., Ltd., Winnipeg, Man., to cost \$250,000. John Fegles is engineer.

New Brunswick Electric Power Commission, 5 Canterbury Street, St. John, N. B., is considering erection of a steam power plant at Moncton, N. B. A. E. Reilly is chairman of commission.

In connection with erection of an artificial gas manufacturing plant at Three Rivers, Que., to cost \$500,000, Quebec Gas & Electric Co., 72 Mountain Hill, Quebec, expects to lay about 20 miles of pipe. Arrangements are being made for erection of a gas holder.

Foreign

UNDER direction of Government of Chile, Santiago, Department of Minister of Finance, a new nitrate combine is being organized to be known as Compania Salitrera Nacional, and plans will soon be drawn for two large nitrate

plants in that country, each to have annual capacity of 700,000 tons. Chilean Congress has approved financing for project, authorizing a fund of 1,000,000,000 pesos (about \$120,000,000). New company will also be interested in existing nitrate plants in Chile.

Kelsey-Hayes Wheel Corporation, 3600 Military Avenue, Detroit, manufacturer of wire wheels, affiliated with Wire Wheel Corporation of America, Inc., Detroit, contemplates establishment of new plant at Dagenham, near London, England, to cost over \$350,000 with equipment. It is understood that large portion of output will be used for Ford automobiles manufactured in England and Europe.

Ford Motor Corporation of Mexico, Ltd., Mexico City, Mexico, a subsidiary of Ford Motor Co., Dearborn, Mich., has acquired property in federal district near Mexico City, as site for new assembling plant, to cost close to \$1,000,000 with equipment, scheduled for completion early in 1931. At that time present local assembling plant will be closed and production increased and concentrated at new works. Ford Motor Co. of England, Ltd., London, has arranged with Isotta-Fraschini Co., Rome and Milan, Italy, manufacturer of automobiles, to take over large part of latter's plant at Milan for manufacture of Ford cars. New equipment will be installed for straight-line production; initial operations will be given over primarily to assembling, with parts shipped from other Ford plants. Property near present plant has been acquired for new production units, to be given over to complete parts manufacture. New car will be sold under name of Ford-Isotta-Fraschini; present Isotta-Fraschini automobile will be manufactured as heretofore, as well as aircraft engines. A new Ford subsidiary will be formed to carry out project, capitalized at 100,000,000 lire (about \$5,000,000). In connection with agreement between two companies, Ford Motor Co. has secured rights to manufacture Isotta-Fraschini aircraft engines in United States in units up to 1000 hp.

Building Construction Shows Large Gain

Contracts let in June for new building and engineering work in the 37 States east of the Rocky Mountains are reported by F. W. Dodge Corporation at \$600,573,000. This is the largest total for any month since July, 1929. It shows a gain of 31 per cent over the total of \$457,416,000

for May and an increase of over 13 per cent on the \$529,891,000 for June, 1929.

Construction contracts for the first half of 1930 aggregated \$2,638,013,000. This represents a drop of 12½ per cent from the \$3,015,547,000 for the first half of 1929. At the end of May the decline from last year was 18 per cent, which now has been partly made up.

For the sixth consecutive month the public works and utilities group showed the largest total. In June this amounted to \$251,916,000, or greater than the combined second, third and fourth classes in point of size. Residential buildings came second, with \$96,816,000; industrial buildings, third, with \$93,619,000; and commercial buildings fourth, with \$59,080,000.

Contemplated new work reported in June amounted to \$763,216,000. This shows an increase of more than 20 per cent from the \$634,073,000 reported as contemplated in June, 1929.

Industrial Machinery Exports Growing

Exports of industrial machinery for May showed an increase of 16 per cent in value over May, 1929, and brought the total for the five months to \$110,181,000, compared with \$104,041,000 for the corresponding period of last year, according to the Department of Commerce, Industrial Machinery Division. Metalworking, construction and well and refinery machinery were mainly responsible for this gain.

Metal-working machinery exports showed the greatest increase. Foreign shipments of this class made a gain of 69 per cent for the month, while for the first five months this trade is 26 per cent above that of the same period of last year. Engine lathes were one of the items which contributed to this growth, showing an increase of \$500,000 for the month and a gain of 70 per cent for the longer period. Exports of milling machines moved from \$1,107,000 to \$1,565,000 in the five months' comparison.

Railroads Have Less Traffic Than in 1929 or 1928

Freight traffic handled by Class I railroads in May amounted to 36,576,433,000 net ton-miles, according to the Bureau of Railway Economics, Washington. Compared with May, 1929, this was a reduction of 5,269,075,000 net ton-miles, or 12.6 per cent, and a reduction of 2,686,673,000 net ton-miles, or 6.8 per cent from May, 1928.

Freight traffic handled by Class I railroads in the first five months amounted to 177,826,476,000 net ton-miles. This was a reduction of 19,917,516,000 net ton-miles, or 10.1 per cent, from the like period in 1929, and of 8,820,008,000 net ton-miles, or 4.7 per cent, from the same period in 1928.

Industrial Movie Talks About Wire Rope

A talking industrial motion picture has been produced by the American Steel & Wire Co., featuring a trip through the mills in which wire rope is made.

As each stage of manufacture is viewed, it is orally explained in a detailed and impressive manner. At certain spots where the action does not require conversation, lively music is used.

Steel for Agricultural Building Awarded

The American Bridge Co. is said to have been awarded the contract for the steel for the Department of Agriculture building to be constructed in Washington. The estimated steel requirements are about 2300 tons. The general contract for the building, which will cover an entire city block, went to the Nelson-Pedley Construction Co., Philadelphia.

New Booklet on Tariff

To aid manufacturers, importers and exporters in avoiding mistakes in procedure under the new tariff act, a booklet entitled "Changes in Customs Administrative Provisions" has been published by the Merchants' Association of New York for distribution to its members. The booklet covers the 52 administrative sections of the act, explaining the new procedure called for in each. Changes have been made in practically all of the sections and certain of the new ones provide drastic alterations of the previous code.

American railroads established in May a new high record for any month in the speed with which freight trains were operated, according to the Bureau of Railway Economics. The average speed was 13.9 miles an hour, between terminals. This was an increase of 0.1 mile above the best previous record, 13.8 miles, attained in both March and April of this year.

Employment and Payroll Totals in Identical Plants in May and April (a)

Establishments	Number on Payroll		Weekly Payroll (Thousands)	
	May	April	May	April
Iron and steel.....	206	270,153	270,355	\$8,401
Foundry and machine shop.....	1,105	259,889	266,556	8,006
Machine tools.....	154	34,060	35,071	1,001
Hardware makers.....	73	28,724	29,150	652
Steam and hot-water heating appliances.....	112	30,557	31,067	819
Stoves.....	136	20,530	20,870	532
Structural ironwork.....	180	30,170	29,921	906
Cast iron pipe.....	39	11,340	11,270	275
Automobiles.....	215	369,810	364,421	12,156
Agricultural implements.....	90	28,590	30,630	783
Shipbuilding.....	92	42,376	43,707	1,317
Electrical machinery.....	211	192,278	199,858	6,018

(a) United States Bureau of Labor Statistics.

